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SELECTED WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center, Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 11, NUMBER 1
JANUARY 1, 1978

W78-00001 -- W78-00500

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into 10 fields and 60 groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on the inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, DC 20240

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01 NATURE OF WATER
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02 WATER CYCLE
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03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
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07 RESOURCES DATA
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ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

1. NATURE OF WATER

1A. Properties

PHYSICAL OCEANOGRAPHY OF DEEP-WATER DUMPSITE 106 FEBRUARY-MARCH, 1976,
National Marine Fisheries Service, Narragansett, RI. Atlantic Environmental Group.
J. J. Bisagni.
In: NOAA Dumpsite Evaluation Report 77-1, Baseline Report of Environmental Conditions in Deepwater Dumpsite 106, Vol I, Physical Characteristics, p 87-115, June 1977. 21 fig, 1 tab, 5 ref.

Descriptors: *Waste disposal, *Baseline studies, *Environmental effects, *Oceanography.
Identifiers: *Outer continental shelf, *Physical oceanography, Ocean dumping, Oceanographic data, Environmental conditions.

During February and March 1976, the last in a series of characterization cruises was conducted in and around Deepwater Dumpsite 106, aboard the FRS OREGON II. Physical oceanographic data collected during the cruise consisted of: 121 surface temperature and surface salinity measurements, 121 expendable bathythermograph (XBT) drops, 24 deep hydrocasts using Niskin bottles and reversing thermometers, 11 STD stations and 12 shallow water sapling casts. The baseline data should serve as a frame of reference for environmental impact studies. (Sinha - OEIS)
W78-00315

2. WATER CYCLE

2A. General

NOAA-ARS COOPERATIVE SNOW RESEARCH PROJECT - WATERSHED HYDRO-CLIMATOLOGY AND DATA FOR WATER YEARS 1960-1974,
National Weather Service, Silver Spring, MD. Office of Hydrology.
For primary bibliographic entry see Field 2C.
W78-00068

A NUMERICAL METHOD FOR THE SIMULATION OF UNSTEADY GROUND-WATER FLOW IN BOTH SATURATED AND UNSATURATED SOILS,
Universitaet Muenster, Muenster (West Germany), Inst. fuer Numerische und Instrumentelle Mathematik.
For primary bibliographic entry see Field 2G.
W78-00093

A MARKOV CHAIN MODEL OF DAILY RAINFALL,
Kentucky Univ., Lexington. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2B.
W78-00437

2B. Precipitation

RAINFALL SYNTHESIS WITH SCANTY DATA,
Universidad Catolica de Chile, Santiago. Escuela de Ingenieria.
E. A. Varas, and R. K. Linsley.
Journal of Hydrology, Vol. 34, No. 3/4, p 235-249, August 1977. 8 fig, 2 tab, 11 ref.

Descriptors: *Rainfall, *Model studies, *Mathematical models, *California, Synthesis, Precipitation(Atmospheric), Storms, Seasonal, Annual, Runoff, Synthetic hydrology, Streamflow, Probability, Markov processes, Mathematics, Meteorology.
Identifiers: *Rainfall synthesis.

Presented in this paper were mathematical models for seasonal and storm rainfall synthesis. Also, established in this paper were relationships to estimate model parameters when observed records are scarce. Seasonal rainfall was simulated by a linear model which maintains means, variances and serial correlation at each location, and cross-correlation between stations. Parameters were predicted in terms of longitude, latitude, elevation, slope of air streamlines, barrier height, and distance between stations. Storms were modelled hourly at a key station by a Markov process, and linear relationships were used to transfer the simulated storms to other locations. Predictive relationships were developed for the parameters of the storm model as functions of seasonal characteristics. Application of the model showed that it maintains the principal moments of hourly rainfall rates and of the amounts and durations of storms. The hourly rainfall generated by the model, when used as input to the Stanford watershed model, produces detailed streamflow series similar to observed runoff volumes and peak flows. (Sims-ISWS)
W78-00082

METEOROLOGICAL AND TIDAL EXCHANGES BETWEEN CORPUS CHRISTI BAY, TEXAS, AND THE NORTHWESTERN GULF OF MEXICO,
Texas Univ. at Austin, Port Aransas. Marine Science Inst.
For primary bibliographic entry see Field 2L.
W78-00088

EFFECTS OF THE URBAN ENVIRONMENT ON HEAVY RAINFALL DISTRIBUTION,
Illinois State Water Survey, Urbana.
F. A. Huff.
Water Resources Bulletin, Vol 13, No 4, p 807-816, August 1977. 2 fig, 3 tab, 11 ref. NSF GI-38317, AEN73-07796.

Descriptors: *Rainfall, *Cities, *Missouri, *Distribution patterns, Urbanization, Industries, Effects, Air pollution, Pollutants, Precipitation(Atmospheric), Weather modification, Excessive precipitation, Urban hydrology, Storms, Weather, Meteorology.
Identifiers: *St. Louis(Mo), Inadvertent weather modification, Hydrometeorology, Urban-induced rainfall.

A network of 225 recording raingages was operated over an area of 5200 sq km in the St. Louis region during 1971-1975, in conjuncton with an extensive investigation of urban effects on precipitation. Study of urban-induced effects on the frequency of heavy rainstorms revealed a pronounced increase in the occurrence of storms producing 25 mm (1 in) or more of rain. The increase was greatest in an area that is frequently in the path of storms passing across 2-urban-industrial regions. Analyses of raincells (rain intensity center) within heavy cnvective storms showed a pronounced increase in water yield from cells exposed to potential urban effects, compared with those cells exposed only to the surrounding rural environment. Naturally-occurring heavy cells tend to undergo the greatest enhancement from urban exposure. Other analyses indicated an above-average frequency of excessive rain rates for periods of 5 min to 2 hour downwind of the urban-industrial complex. It was concluded that urban-induced intensification of short-duration rainstorms in sufficient to merit inclusion in the design and operation of urban-area hydrologic systems that control the flow of surplus storm water. (Sims-ISWS)
W78-00091

ICE NUCLEI IN SEAWATER, FOG WATER AND MARINE AIR OFF THE COAST OF NOVA SCOTIA: SUMMER 1975,
National Oceanic and Atmospheric Administration, Boulder, Co. Atmospheric Physics and Chemistry Lab.
R. C. Schnell.
Journal of the Atmospheric Sciences, Vol 34, No 8, p 1299-1305, August 1977. 7 fig, 20 ref.

Descriptors: *Nucleation, *Ice, *Canada, *Atmosphere, *Oceans, *Atlantic Ocean, Fog, On-site investigations, On-site data collection, Measurement, Air, Sea water, Sampling, Data processing, Cloud physics, Meteorology.
Identifiers: *Ice nuclei, *Nova Scotia, *Marine fog.

Ice nuclei were measured in seawater, fog water, and the free atmosphere from 28 July to 11 August during the 1975 Hayes Fog Cruise off the east coast of Nova Scotia, Canada. Some seawater samples were found to contain ice nuclei active at -4 to -5C, although the majority of seawater samples contained no nuclei active at temperatures warmer than -14C. Half of the fog water samples contained ice nuclei active at temperatures warmer than -10C; some nuclei were active at -2C. Atmospheric ice nucleus concentrations varied from 1.1 to 580 nuclei/cu m active at -15C. Some bacteria isolated from fog water were observed to initiate ice at -1.5C. High concentrations of active ice nuclei in seawaters and fog waters were associated with high concentrations of biological materials in the same samples. (Sims-ISWS)
W78-00094

IMPACT OF ACID PRECIPITATION ON FRESHWATER ECOSYSTEMS IN NORWAY,
Norsk Inst. for Vannforskning, Blindern.
For primary bibliographic entry see Field 5C.
W78-00226

ACID PRECIPITATION IN CANADA,
Department of the Environment, Ottawa (Ontario).
For primary bibliographic entry see Field 5B.
W78-00227

CLIMATIC STUDY OF NEW YORK BIGHT,
National Climatic Center, Asheville, NC.
W. A. Brower Jr.
In: NOAA Dumpsite Evaluation Report 77-1, Baseline Report of Environmental Conditions in Deepwater Dumpsite 106, Vol I, Physical Characteristics, p 117-218, June 1977. Chiefly data tables.

Descriptors: *Climatic data, *Baseline studies, *Environmental effects, New York, New Jersey.
Identifiers: *Outer continental shelf, *New York Bight, Marine climatology, Air-water interaction, Sea-air interaction, Environmental conditions.

The New York Bight, covers the coastal region and waters bounded by 38 degrees N latitude, 71 degrees longitude and the US coastline. It encompasses Deepwater Dumpsite 106, located at 38 degrees 45'N, 72 degrees 15'W. This study describes the environment of the dumpsite, of the adjacent waters, and of the Bight's coastal region. Tables and figures are for selected stations and marine areas within New York Bight for the general period 1949 to 1974. The baseline data should serve as a frame of reference for environmental impact studies. (Sinha - OEIS)
W78-00316

CHANGES IN TEMPERATURE AND AIR HUMIDITY DURING IRRIGATION IN THE DESERT ZONE, (IN RUSSIAN),
Desert Inst., Ashkhabad (USSR).
For primary bibliographic entry see Field 3F.
W78-00347

DESERT RODENT ABUNDANCE IN SOUTHERN ARIZONA IN RELATION TO RAINFALL,
Texas A and M Univ., Uvalde. Agricultural Research and Extension Center.
For primary bibliographic entry see Field 2I.
W78-00385

WHERE TO FIND WEATHER AND CLIMATIC DATA FOR FOREST RESEARCH STUDIES AND MANAGEMENT PLANNING,
North Central Forest Experiment Station, St. Paul, MN.
For primary bibliographic entry see Field 7C.
W78-00386

A MARKOV CHAIN MODEL OF DAILY RAINFALL,
Kentucky Univ., Lexington. Dept. of Agricultural Engineering.
C. T. Haan, D. M. Allen, and J. O. Street.
Water Resources Research, Vol. 12, No. 3, p 443-449, June 1976. 10 tab, 8 ref. OWRT A-045-KY(2).

Descriptors: *Markov processes, *Rainfall, *Stochastic processes, Precipitation(Atmospheric), Water resources, Weather patterns, Statistical methods, Parametric hydrology, Streamflow, Model studies.
Identifiers: *Markov chain model, *Daily rainfall, Dry days, Historical rainfall, Wet days, Two-parameter distribution.

A stochastic model based on a first-order Markov chain was developed to simulate daily rainfall at a point, since the design on many water resources projects requires knowledge of possible long-term rainfall patterns. The model uses historical rainfall data to estimate the Markov transitional probabilities. A separate matrix is estimated for each month of the year, using 7 x 7 transitional probability matrices. The model is capable of simulating a daily rainfall record of any length, based on the estimated transitional probabilities and frequency distributions of rainfall amounts. The simulated data have statistical properties similar to those of historical data. Simulated rainfall was compared with actual rainfall in several ways. The results of these comparisons indicated generally satisfactory performance of the model. The model seemed to generate annual rainfalls that exceeded historical rainfall by about 2.5%, or 1.08 in on the average. A hydrologic model was used to generate streamflow, using both the simulated and historical rainfall. The runoff generated by using the simulated rainfall averaged about 1 in more than that generated by using the historical rainfall. (Roberts - ISWS)
W78-00437

2C. Snow, Ice, and Frost

NOAA-ARS COOPERATIVE SNOW RESEARCH PROJECT - WATERSHED HYDRO-CLIMATOLOGY AND DATA FOR WATER YEARS 1960-1974,
National Weather Service, Silver Spring, MD. Office of Hydrology.
E. A. Anderson, H. J. Greenan, R. Z. Whipkey, and C. T. Machell.
June 1977. 312 p, 36 fig, 13 tab, 24 ref, 8 append.

Descriptors: *Watersheds(Basins), *Data collections, *Precipitation(Atmospheric), *Runoff, *Vermont, Snow, Snowfall, Snowmelt, Rainfall, Air temperature, Evaporation, Land use, Climatology, Weather, Weather data, Soils, Soil moisture, Geology, Topography, Vegetation, Forests, Streamflow, Rain gages, Stream gages, Data processing.

Data were provided for the 3.25 sq mi W-3 watershed which is part of the Sleepers River Research Watershed operated by the Agricultural Research Service near Danville, Vermont. The publication contained streamflow, air temperature, snow course, pan evaporation, and soil moisture data, as well as point measurements and mean areal estimates of precipitation. Also included were data from the NOAA-ARS Snow Research Station which is located adjacent to the W-3 watershed. Detailed measurements of the snow cover and the hydro-meteorological variables affecting snow cover energy exchange have been made since December 1968 at the station as part of a cooperative project to study the physical processes involved in snow metamorphosis and snowmelt. Tabulations of some of the watershed and snow cover variables were included. The remaining variables were summarized. Most of the actual data were contained on an associated magnetic tape. In addition to the data, information was provided as to the quality of the data and the hydro-climatology of the watershed. This is a high quality set of data suitable for use in developing and testing physically based hydrologic models. The watershed is hydrologically representative of most of the glaciated upland regions of the Northeastern United States. The mean annual precipitation during the 15-year period is approximately 43 in, with about 25 in per year of runoff. The maximum water-equivalent of the snow cover is generally about 9 to 12 in. (Sims-ISWS)
W78-00068

EQUILIBRIUM THICKNESS OF ICE JAMS,
Iowa Univ., Iowa City. Inst. of Hydraulic Research.
J-C. Tatinclaux.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 103, No HY9, Proceedings Paper 13179, p 959-974, September 1977. 8 fig, 1 tab, 7 ref, 2 append. CRREL DAAK 03-75-C-0030, NSF ENG72-04118-A02.

Descriptors: *Ice jams, *Ice cover, *Model studies, Mathematical models, Hydraulic models, Laboratory tests, Ice, Streamflow, Rivers, Hydraulics, Flumes, Energy, Data processing.
Identifiers: *Equilibrium methods, *Ice jam thickness, Submergence, Ice formation, Ice floes.

By equating the kinetic energy of ice floes carried by a stream to the potential energy they acquire when submerged, a relationship was derived between the mean velocity of the approach flow and the average thickness of the stable ice jam formed only by accumulation and transport of floes. The relationship was verified by experiments conducted in a refrigerated laboratory flume using real ice and plastic floes. The experiments also confirmed the theoretical prediction that there exists a maximum velocity of the approach flow beyond which no stable jam can exist. For deep channels, the corresponding maximum jam thickness was found to be approximately 36% of the upstream flow depth. (Sims-ISWS)
W78-00074

ICE NUCLEI IN SEAWATER, FOG WATER AND MARINE AIR OFF THE COAST OF NOVA SCOTIA: SUMMER 1975,
National Oceanic and Atmospheric Administration, Boulder, Co. Atmospheric Physics and Chemistry Lab.
For primary bibliographic entry see Field 2B.
W78-00094

PHOTOSYNTHESIS IN THE SNOW: THE ALGA CHLAMYDOMONAS NIVALIS (CHLOROPHYCEAE),
Wisconsin Univ.-Madison. Dept. of Bacteriology.
J. L. Mosser, A. G. Mosser, and T. D. Brock.
Journal of Phycology, Vol. 13, No. 1, March 1977, p. 22-27. 3 fig, 2 tab, 22 ref. ERDA C00-2161-25 and -26.

Descriptors: *Chlamydomonas, *Snow, *Photosynthesis, Soil algae, Soil microorganism, Light intensity, Freezing, Temperature, Montana, Wyoming.
Identifiers: Beartooth Mountains(Mont and Wyo).

Field studies designed to examine the effects of temperature, light and water potential on snow algae in the Beartooth Mountains of Montana and Wyoming suggest that these alga included different temperature straits and that their development can occur only during the summer months. Red blooms of snow algae consisting almost exclusively of large spherical red cells of Chlamydomonas nivalis (Bauer) Wille were examined using photosynthetic 14C-HC03 or 14C02 incorporation as a measure of activity. Photosynthesis occurred optimally at 5.4 x 10 to the 4th power lx but were not inhibited by increased light intensity up to 8.6 x 10 to the 4th power lx, the maximum observed. It is thought unlikely that the significant algal activity occurs at the low temperatures of winter, because low water potentials develop in snow at temperatures below 0-C and photosynthesis was found sensitive to a reduction in water potential. Photosynthesis was much lower following melting of the snow, probably because of decreased diffusion of C02. In general, the results show that the snow algae have high light tolerance, require high water potential and that different populations exhibit a surprising variation in adaptation to low temperature. (Harris-Wisconsin)
W78-00223

RESPONSE OF EURASIAN WATERMILFOIL TO SUBFREEZING TEMPERATURES,
Tennessee Valley Authority, Muscle Shoals, AL. Environmental Biology Branch.
For primary bibliographic entry see Field 5G.
W78-00249

IMPLICATION OF RESOURCE DEVELOPMENT ON THE NORTH SLOPE OF ALASKA WITH REGARD TO WATER QUALITY ON THE SAGAVANIRKTOK RIVER,
Corvallis Environmental Research Lab., College, AK. Arctic Environmental Research Station.
For primary bibliographic entry see Field 5B.
W78-00420

2D. Evaporation and Transpiration

CALCULATION OF EVAPOTRANSPIRATION USING COLOR-INFRARED PHOTOGRAPHY,
Geological Survey, Reston, VA. Water Resources Div.
J. E. Jones.
Available from the Supt. of Documents, GPO, Washington, DC 20402, Price $2.50.

Descriptors: *Evapotranspiration, *Aerial photography, *Remote sensing, *Terrain analysis, *Arizona, Riparian water loss, Riparian plants, Phreatophytes, Transpiration, Tamarisk, Mesquite, Sorghum, Consumptive use, Hydrology.
Identifiers: *Color IR photography, Film standardization, Spectral radiometry, Relative radiometer, *Gila River(Ariz).

Color-infrared photography was used as a relative radiometer to obtain data from 38 photographic missions flown between 1967-71 over the Gila River Phreatophyte Project in southeastern Arizona. Remote-sensing measurements of evapotranspiration from 13 photographic missions flown during 1968 were related to water-budget measurements for a 1,700-acre cleared of vegetation and a 2,200-acre phreatophyte-covered area of the Gila River flood plain. The coefficients of correlation between the water-budget measurements and the remote-sensing measurements were 0.88 for the cleared area and 0.86 for the phreatophyte covered area. Photographic data also were correlated with depth to ground-water level, soil moisture, foliar cover, and volume of canopy.

Computer mapping and digital modeling of the photographic data were useful for spatial and temporal evaluation of the flood plain. The technique used for standardizing the photographic data are explained and examples are shown. It was determined that a color-infrared photographic mission and a computer analysis of the photographic data for the Gila River Phreatophyte Project area cost about a tenth of the amount of conventional species classification and canopy-measurement techniques. An appendix discussing the derived spectral equations and a table of 24 statistical parameters describing the spectral and hydrologic variables is included. (Woodard-USGS)
W78-00212

TRANSPIRATION RATE AND SUCTION FORCE OF PLANTS OF PINE FORESTS UNDER DIFFERENT ECOLOGICAL CONDITIONS, (IN BELORUSSIAN),
Akademiya Navuk BSSR, Minsk. Tsentralny Botanichy Sad.
I. M. Haranovich.
Vyestsi Akad Navuk BSSR Syer Biyal Navuk 2, p 43-47. 1975.

Descriptors: *Transpiration, Plant physiology, *Pine trees, Forest management, Soil moisture, Soil temperature, Air temperature, Grasses.
Identifiers: *Suction force(Plants).

The transpiration rate and suction force of plants of pine forests characterize a number of interrelations in phytocenoses and depend on a whole series of factors. There is a dependence of the suction force and transpiration rate on layering, orientation of the forest margins, development of the grass cover, etc. The suction force and transpiration rate increase with an increase of the air and soil temperature. The transpiration rate increases with an increase of soil moisture; the suction force decreases.--Copyright 1976, Biological Abstracts, Inc.
W78-00334

WATER- AND PHOTOSYNTHESIS-RELATIONS OF DESERT PLANTS IN THE SOUTH ALGERIAN SAHARA: III. ANNUAL COURSE AND CONSTITUTIONAL TYPES, (IN GERMAN),
For primary bibliographic entry see Field 2I.
W78-00358

2E. Streamflow and Runoff

CALCULATORS IN TIMER-COUNTERS FOR CURRENT METERS,
Papuea New Guinea Univ. of Tech., Lae (New Guinea). Dept. of Electrical and Communications Engineering.
For primary bibliographic entry see Field 7B.
W78-00077

UNIFIED VIEW OF WASH LOAD AND BED MATERIAL LOAD,
Thessaloniki Univ., Salonika (Greece).; and Florida Univ., Gainesville. Dept. of Engineering Sciences.
For primary bibliographic entry see Field 2J.
W78-00078

BASIC PRINCIPLES OF RIVER HYDRAULICS,
Alberta Univ., Edmonton. Dept. of Civil Engineering.
G. Parker, and A. G. Anderson.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 103, No. HY9, Proceedings Paper 13233, p 1077-1087, September 1977. 3 fig, 2 tab, 16 ref, 2 append.

Descriptors: *River flow, *Hydraulics, *Model studies, Mathematical models, Alluvial channels, Bed load, Suspended load, Suspended solids, Sediments, Beds, Graphical analysis, Beds under water, Streamflow, Sediment transport, Flow, Rivers.
Identifiers: *River hydraulics.

Derivations of the general form of fluvial resistance and sediment load relations were presented. The relations are sufficiently general to encompass the various specific dimensionally homogeneous relations that appear in the literature. An outline of the number and type of constraints necessary to specify solution sets for problems in equilibrium flow was presented. It was shown that any pair of resistance and load relations uniquely specifies depth-discharge and sediment transport rating curves at given slopes and bed particle Reynolds numbers. Such a format allowed for direct graphical calculation of such parameters as slope, discharge, load, etc., from appropriate input information. Several examples of load and resistance relations presented in the generalized format were analyzed. (Sims-ISWS)
W78-00080

WORLD-WIDE VARIATIONS IN HYDRAULIC GEOMETRY EXPONENTS OF STREAM CHANNELS: AN ANALYSIS AND SOME OBSERVATIONS,
Saint David's Univ. Coll., Dyfed (Wales). Dept. of Geography.
C. C. Park.
Journal of Hydrology, Vol. 33, No. 1/2, p 133-146, March 1977. 3 fig, 2 tab, 34 ref.

Descriptors: *Streamflow, *Channel morphology, *Velocity, *Equilibrium, *Data collections, Climatic zones, Histograms, Drainage area, Distribution patterns, Continuity equation.
Identifiers: *Hydraulic geometry, Triaxial diagrams.

A number of hydraulic geometry studies have been reported since the classic work of Leopold and Maddock. Misconceptions have arisen regarding the nature and magnitude of variations in the hydraulic geometry exponents between areas. Exponent data for 139 at-a-station sites and for 72 downstream cases were collected from the literature, and variations in the data were analyzed. To facilitate simultaneous comparison between the three exponents, the data were plotted on triaxial diagrams, with one axis per exponent. Variations within and between major climatic areas were examined, and similarities between theoretically derived and empirically observed data were appreciated. Some confusion in the literature was attributed to five basic observations: (1) downstream relationships have been related to different flow levels in different studies; (2) differences might be expected between gaging station and field data; (3) several different methods of fitting lines to relationships have been applied; (4) simple power functions may not be the best way of empirically describing the hydraulic geometry relationships in some cases; and (5) the debate on whether or not velocity decreases downstream at a constant flow frequency has been perpetuated and remains largely unresolved. (Singh-ISWS)
W78-00081

LOW-FLOW CHARACTERISTICS AT GAGING STATIONS ON THE WISCONSIN, FOX, AND WOLF RIVERS, WISCONSIN,
Geological Survey, Madison, WI. Water Resources Div.
For primary bibliographic entry see Field 5B.
W78-00204

LATERAL MIGRATION OF THE MIDDLE SACRAMENTO RIVER, CALIFORNIA,
Geological Survey, Menlo Park, CA. Water Resources Div.
For primary bibliographic entry see Field 2J.
W78-00208

HYDROLOGIC DATA FOR URBAN STUDIES IN THE FORT WORTH, TEXAS METROPOLITAN AREA, 1975,
Geological Survey, Austin, TX. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00209

THE STRUCTURE OF A TURBULENT FLOW IN A CHANNEL OF COMPLEX SHAPE,
Geological Survey, Atlanta, GA. Water Resources Div.
For primary bibliographic entry see Field 8B.
W78-00211

COOPERATIVE INSTREAM FLOW SERVICE GROUP: THE FIRST YEAR.
Fish and Wildlife Service, Fort Collins, CO. Cooperative Instream Flow Service Group.
For primary bibliographic entry see Field 4A.
W78-00497

2F. Groundwater

WATER TABLE RESPONSE TO A SEQUENCE OF RECHARGES,
South Dakota State Univ., Brookings. Dept. of Agricultural Engineering.
S. T. Chu.
Water Resources Research, Vol 13, No 4, p 738-742, August 1977. 3 fig, 3 tab, 11 ref.

Descriptors: *Water table, *Subsurface drainage, *Model studies, Mathematical models, Tile drainage, Soil water, Groundwater, *Recharge, *Groundwater recharge, Drainage, Fluctuations, Hydraulic conductivity, Agriculture.

Water table behavior under subsurface drainage conditions was analyzed by considering water table fluctuations in response to a sequence of recharge events. The derived solution is applicable to a nonhomogeneous soil profile. An iteration procedure was introduced to illustrate the application of the theoretical results. Agreement between theoretical analysis and field data was shown to be adequate. (Sims-ISWS)
W78-00072

DEVELOPMENT AND RESORPTION OF A THERMAL DISTURBANCE IN A PHREATIC AQUIFER WITH NATURAL CONVECTION,
Neuchatel Univ. (Switzerland). Centre de Hydrogeologie.
For primary bibliographic entry see Field 5B.
W78-00083

HEAT DISPERSION EFFECT ON THERMAL CONVECTION IN ANISOTROPIC POROUS MEDIA,
Oslo Univ. (Norway). Dept. of Mechanics.
P. A. Tyvand.
Journal of Hydrology, Vol. 34, No. 3/4, p 335-342, August 1977. 11 ref.

Descriptors: *Thermal water, *Porous media, *Groundwater movement, Convection, Groundwater, Flow, Model studies, Mathematical models, Mathematical studies, Numerical analysis, Darcys law, Hydrology.
Identifiers: *Heat dispersion, Peclet numbers, Rayleigh number.

The effect of hydrodynamic dispersion on the onset of thermal convection in flows through anisotropic porous media was studied theoretically. The porous layer was homogeneous and bounded by 2 infinite perfectly heat-conducting impermeable horizontal planes kept at constant temperatures. Horizontal isotropy with respect to impermeability and thermal diffusivity was assumed. A pressure-driven basic flow was con-

sidered in the limits of small and large Peclet numbers. The analysis showed that the onset of convection in both cases is independent of longitudinal dispersion, while dispersion in lateral directions has stabilizing effects. The preferred mode of disturbance consists of stationary rolls with axes aligned in the direction of the basic flow. (Sims-ISWS)
W78-00084

SERIES EXPRESSION FOR THE WELL FUNCTION FOR LEAKY STRIP AQUIFERS,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
A. Vandenberg.
Journal of Hydrology, Vol. 34, No. 3/4, p 389-394, August 1977. 5 ref.

Descriptors: *Aquifers, *Model studies, *Mathematical models, Wells, Observation wells, Equations, Mathematics, Pumping, Leakage, Groundwater, Groundwater movement, Water table.
Identifiers: *Well function, Series expressions.

Two series expansions of the well function for leaky strip aquifers were given which provide for rapid calculation over the domain of practical applications. (Sims-ISWS)
W78-00085

GROUND WATER IN THE FRESNO AREA, CALIFORNIA,
Geological Survey, Menlo Park, CA. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-00190

GROUND-WATER LEVELS IN THE UNITED STATES, 1972-74. NORTH-CENTRAL STATES.
Geological SSurvey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00191

GROUND-WATER LEVELS IN THE UNITED STATES, 1971-74. SOUTHWESTERN STATES.
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00192

SUMMARY GROUND-WATER RESOURCES OF LUZERNE COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, PA. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-00193

GROUNDWATER IN THE SOUTHERN PART OF THE CESKOTREBOVSKA VRCHOVINA (HIGHLAND),
Ceskoslovenska Akaedmie Ved, Brno. Geograficky Ustav.
H. Kriz.
Prirodoved Pr Ustavu Cesk Akad Ved Brne. 7(11), p 1-43, 1973.

Descriptors: *Groundwater, *Hydrogeology, *Statistical processes, *Water levels, Water wells, *Springs, *Discharges(Water).
Identifiers: *Czechoslovakia(Ceskotrebovska Vrchovina).

Processing of results obtained from longterm hydrological observations and special methods developed and used in Czechoslovakia are discussed. Statistics are applied to the processing of results. The 1st part of the work contains concise geological and hydrogeological characteristics. The 2nd part evaluates the regime of groundwater on the basis of a statistical processing of data obtained from observations of groundwater levels in numerous wells and of discharges of some important springs. The methods used are similar to those of the processing of discharges of a stream but are adapted to the needs of groundwater hydrology. Greater attention is paid to the analysis of the course of long-term deviations of groundwater levels and discharges of springs. Regionalization of groundwater from the geographical viewpoint is discussed.--Copyright 1975, Biological Abstracts, Inc.
W78-00374

DISSOLUTION KINETICS OF CARBONATE ROCKS 1. EFFECTS OF LITHOLOGY ON DISSOLUTION RATE,
West Virginia Univ., Morgantown. Dept. of Geology and Geography.
For primary bibliographic entry see Field 2K.
W78-00435

CHARACTERIZATION OF COARSE POROUS MEDIA,
California Univ., Berkeley. Sanitary Engineering Research Lab.
For primary bibliographic entry see Field 8D.
W78-00436

A HIERARCHY OF RESPONSE FUNCTIONS FOR GROUNDWATER MANAGEMENT,
Mekoroth Water Co., Tel-Aviv (Israel). Systems Engineering Dept.
For primary bibliographic entry see Field 4B.
W78-00444

SHAPES OF STEADY STATE PERCHED GROUNDWATER MOUNDS,
Iowa State Univ., Ames. Dept. of Agronomy.
M. Y. Khan, D. Kirkham, and R. L. Handy.
Water Resources Research, Vol. 12, No. 3, p 429-436, June 1976. 6 fig, 2 tab, 21 ref. OWRT B-019-IA(7).

Descriptors: *Groundwater, Groundwater barriers, Groundwater resources, *Aquifers, Groundwater recharge, Flow nets, *Water table.
Identifiers: *Perched groundwater mounds.

A potential theory flow solution for the potential function, stream function, and shape of the water table is given for a class of steady state two- and three-dimensional perched groundwater mounds formed under a long rectangular recharge basin or under a circular recharge basin. The solutions are done by a Gram-Schmidt method and a simple iteration scheme. The mounds are formed in a stratum of conductivity k1 overlying a perching stratum of much lower conductivity k2. Capillary fringe effects are neglected. The recharge rate is R. Potential theory mound heights are compared with those given by the Dupuit-Forchheimer (DF) theory. For the cases computed, the DF theory gives apex heights of mounds correct to better than 7% for two-dimensional mounds. For three-dimensional mounds the DF theory gives in one case a mound height that is 69% too low and in another case a mound height that is 28% too low. Profiles of the computed mounds are graphed, and examples of use of the graphs in applications are given. Sample flow nets are presented. (Skogerboe-Colorado State)
W78-00446

2G. Water In Soils

WATER AND TEMPERATURE REGIME OF THE MAIN TYPES OF SOILS OF THE APSHERON PENINSULA, (IN AZERBAIJANIAN),
R. Manedov.
Izv Akad Nauk Az SSR Ser Biol Nauk 3, p 51-58, 1975.

Descriptors: *Soil water, Soil types, *Soil temperature, Crops, Vegetables, Climates, Irrigation, Seasonal.
Identifiers: USSR, *Azerbaijan SRR(Apsheron peninsula).

The water and temperature regimes of the main types of soils under various crop plants depend on the relief and season. In the territory of the Apsheron peninsula (Azerbaijan SSR, USSR) 2 types of water regime are observed: a nonleaching water regime on virgin soils and an irrigation regime on irrigated soils. The water regime of the investigated soils in not considered normal; it can be regulated only by irrigation. The soil and climatic conditions of the peninsula favor vegetable growing during the entire year. --Copyright 1976, Biological Abstracts, Inc.
W78-00002

WATER TABLE RESPONSE TO A SEQUENCE OF RECHARGES,
South Dakota State Univ., Brookings. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2F.
W78-00072

NONLINEAR ADSORPTION IN LAYERED POROUS MEDIA FLOW,
Polytechnic Inst. of New York, brooklyn. Dept. of Chemical Engineering.
S. H. Lin.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 103, No HY9, Proceedings Paper 13192, p 951-958, September 1977. 3 fig, 11 ref, 2 append.

Descriptors: *Adsorption, *Dispersion, *Porous media, *Model studies, Mathematical models, Seepage, Seepage control, Equations, Soil water, Soil water movement, Solutes, Groundwater.
Identifiers: Nonlinear adsorption.

Dispersion and adsorption of solute in multilayer saturated porous media with constant specific discharge were examined. Differential equations were formulated for describing the solute concentration in two-layer porous media. A general nonlinear equilibrium adsorption isotherm of the Freundlich type was considered. The nonlinear coupled differential equations were solved by the orthogonal collocation method to give the solute concentration distributions in the media when subject to a step-change or an exponential input. It was found that under many circumstances, the general dispersion model can be reduced to a simpler plug-flow model by neglecting the dispersion component in the governing differential equations. A criterion for this simplification also was suggested. (Sims-ISWS)
W78-00073

PHOSPHATE REMOVAL BY SANDS AND SOILS,
New York State Dept. of Environmental Conservation, Albany. Research Unit.
For primary bibliographic entry see Field 5D.
W78-00092

A NUMERICAL METHOD FOR THE SIMULATION OF UNSTEADY GROUND-WATER FLOW IN BOTH SATURATED AND UNSATURATED SOILS,
Universitaet Muenster, Muenster (West Germany), Inst. fuer Numerische und Instrumentelle Mathematik.
U. Hornung.
Soil Science, Vol 124, No 3, p 140-144, September 1977. 6 fig, 7 ref.

Descriptors: *Soil water movement, *Porous media, *Model studies, *Mathematical models, Saturated flow, Unsaturated flow, Soil water, Groundwater, Groundwater movement, Hydraulic

conductivity, Moisture content, Pressure head, Infiltration, Soil physics, Soil science.

A numerical method for the simulation of unsteady groundwater flow was presented. In order to treat soils that are both saturated and unsaturated, stiffly stable, multiple-value methods with automatic control of order and step size were used. Numerical results from some model calculations were given. (Sims-ISWS)
W78-00093

ON THE QUANTIFICATION OF THE TRANSFORMATION AND ACCUMULATION CAPACITY OF SOIL, (IN GERMAN),
Humboldt-Univ. zu Berlin (East Germany) Sektion Pflanzenproduktion.
E. Ehwald.
Wiss Z Humboldt-Univ Berl Math Naturwiss Reihe 23(6), p 697-704, 1974.

Descriptors: *Soil types, *Nitrogen, *Phosphorus, *Potassium, Soil water movement.

An example of the water-, K-, P-d and N- relations is used in regard to better agrochemical and agrophysical characterization of soils. --Copyright 1976, Biological Abstracts, Inc.
W78-00104

SOLUBLE CATIONS BENEATH A FEEDLOT AND AN ADJACENT CROPPED FIELD,
Agricultural Research Service, Lincoln, NE.
For primary bibliographic entry see Field 5B.
W78-00121

SOIL PROCESSES AND PRODUCTIVITY IN RELATION TO CLIMATIC CYCLES IN KAZAKHSTAN, (IN RUSSIAN),
Akademiya Nauk Kazakhskoi SSR, Alma-Ata. Inst. Pochvovedeniya.
V. M. Borovsky.
Geoderma 15(1), p 41-49, 1976.

Descriptors: *Precipitation(Atmospheric), *Soils, *Climates, Drought, Floods, *Soil moisture, Groundwater, Nitrogen, Nitrates, Ammonia.
Identifiers: *USSR(Kazakstan).

The amount of precipitation in a number of boreal zone regions changes greatly from year to year. The precipitation fluctuation curves are in conformity with those of the solar activity having 11-yr or secular (80-90 yr)periodicity. Observations carried out in the lower reaches of the Syr-Darya River (USSR) showed that the river discharge fluctuations are subject to the same relationships. In wet years severe floods occur, with soils being swamped in depressions and the salinization process intensified on the highlands. In dry years the swamped soils dry up and turn into meadow-boggy soils, and the salinization process ceases due to the lowering of the ground water. In the alluvial-meadow soils of the Syr-Darya levees the soils become salinized in dry years, whereas in wet years the accumulated salts are washed away by floods. The hydrologic regime affects the irrigated paddies as well; in spring prior to flooding in wet years the groundwater table is higher than it is in dry years. In drought years the moisture storage in the soils of the North Kazakhstan experimental stations is negligible and not enough for a good grass yield, whereas in wet years the yield is satisfactory. The natural addition of plant residues to the soil is also of a rhythmical nature, depending upon the moistening rhythm. In dry years biochemical processes in the soil are much less intensive than they are in wet years, and the composition of the resultant products is different. For example, N compounds in chestnut soils of the Tien Shan foothills in wet years are mainly represented by ammonia forms and in dry years by nitrate forms. Knowing these relationships would be of great scientific and practical value in forecasting agricultural production and taking preventive measures in due time against drought and other hazards.
W78-00174

FACTORS AFFECTING DIMETHYLNITROSAMINE FORMATION IN SAMPLES OF SOIL AND WATER,
Cornell Univ. Agricultural Experiment Station, Ithaca, NY. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W78-00215

ATMOSPHERIC NITROGEN FIXATION BY FREE-LIVING MICROORGANISMS: PART 2. THE EFFECT OF TEMPERATURE AND MOISTURE ON THE DEVELOPMENT OF NITROGEN-FIXING MICROORGANISMS AND THE PROCESS OF BIOLOGICAL NITROGEN FIXATION,
Akademiya Nauk SSSR, Novosibirsk. Inst. of Soil Sciences and Agrochemistry.
For primary bibliographic entry see Field 5B.
W78-00220

PHOTOSYNTHESIS IN THE SNOW: THE ALGA CHLAMYDOMONAS NIVALIS (CHLOROPHYCEAE),
Wisconsin Univ.-Madison. Dept. of Bacteriology.
For primary bibliographic entry see Field 2C.
W78-00223

METHOD AND APPARATUS FOR CONSERVING SOIL WATER,
For primary bibliographic entry see Field 3B.
W78-00276

THE EFFECT OF FLOODING ON THE AVAILABILITY OF ZINC AND MANGANESE TO RICE,
Commonwealth Scientific and Industrial Research Organization, Glen Osmond (Australia). Div. of Soils.
For primary bibliographic entry see Field 3F.
W78-00337

FIELD EXPERIMENTS ON THE USE OF CHLOROCHOLINE CHLORIDE (CCC) WITH WINTER RYE, (IN GERMAN),
Landwirtschaftliche Forschungsanstalt, Buentehof (West Germany).
P. W. Kuerten, W. Schuster, and H. Kuehn.
Z Acker-Pflanzenbau. 135(1), p 29-42, 1972.

Descriptors: *Chlorides, *Rye, *Soil moisture, Loams, Sands, *Soil treatment, Colloids, Root systems.
Identifiers: *Chlorocholine chloride.

Field experiments were carried out in 2 locations in Germany with different soils and differing humidity relations, an alluvial loam soil rich in colloids (Giessen) and a light sandy soil (Dulmen), in 2 yr (1967 and 1968) with 3 rye cultivars, to test their reaction to CCC at different doses and applied at different times. A slight reduction in the mean straw length and a slight improvement in standing capacity as a result CCC treatment was accompanied by a significant increase in grain yield, particularly in 'Petkuser Normalstroh' rye and in the drier locality (Giessen). In Carsten's winter rye and in a breeding strain of 'Carsten' there was, in spite of a more marked reduction in straw length and improved standing capacity, usually no significant improvement in grain yield. Reductions in yield were also observed. The yield of 'Carsten's' winter rye was usually very high even without CCC treatment. Since the yield increases observed, even in the 2 'Carsten' cultivars occurred mainly in a dry year and on the soil with high colloid content and poor water supply, it is assumed that CCC enhances development of a stronger root system with more prolonged activity, which in turn resulted in improved water supply at the time of anthesis and grain development. Neither number of fertile ears per unit area nor 1000-grain weight displayed a definite relation to yield, so the yield increases observed are ascribed to an increase in number of grains per year. The time of application of CCC had only a small influence: the higher dose showed advantages in certain cases.--Copyright 1974, Biological Abstracts, Inc.
W78-00341

CHARACTERIZATION OF COARSE POROUS MEDIA,
California Univ., Berkeley. Sanitary Engineering Research Lab.
For primary bibliographic entry see Field 8D.
W78-00436

WATER CONTENT AND BULK DENSITY DURING WETTING OF A BENTONITE-SILT COLUMN,
Oklahoma State Univ., Stillwater. Dept. of Agronomy.
D. L. Nofziger, and D. Swartzendruber.
Soil Science Society of America Journal, Vol. 40, No. 3, p 345-348, May-June 1976. 6 fig, 14 ref. OWRT B-014-IND(9).

Descriptors: *Soil moisture, Soil water, *Bulk density, *Soil water movement, Soils, Soil properties, Clays, Seepage, Saturated flow, Unsaturated flow, Methodology.
Identifiers: *Gamma ray attenuation, Soil columns.

An improved method of dual-energy gamma-ray attenuation was used to measure water content and bulk density rapidly and accurately, during one-dimensional, unsaturated water movement into a column of an equal-part mixture of initially air-dry, highly swelling bentonite and silt. The bulk density near the inlet end of the column decreased rapidly as water entered. Since the ends of the column were confined, the expansion of the wetted bentonite-silt produced a compensating compression in the remaining air-dry portion of the column. Several water-content variables were plotted against the so-called reduced material coordinate m/t(1/2) (Boltzmann variable expressed in terms of the material coordinate m and time t). Neither the volumetric water content nor the volumetric water ratio would coalesce the data when plotted against m/t(1/2). In contrast, a plot of water saturation vs. m/t(1/2) did coalesce the data into a single curve, except for very early times at positions nearer than 1 cm to the water inlet. (Skogerboe-Colorado State)
W78-00445

STUDY OF THE STATISTICAL STRUCTURE OF MOISTURE FIELDS FOR AUTOMATIZING THE WATERING OF SOIL IN HOTHOUSES, (IN RUSSIAN),
Vsesoyuznyi Nauchno-Issledovatel
I. I. Zdanevich.
Dokl Vses (Ordena Lenina) Akad S-Kh Nauk Im V I Lenina. 9, p 45-46, 1974.

Descriptors: *Soil moisture, Greenhouses, *Moisture content, Automation, Statistical processes, Regulation, Plant growth.

The 3-dimensional statistical structure of the moisture field of soil in hothouses was investigated. The moisture field can be considered homogeneous and isotropic with respect to a spatial normalized correlation function, knowledge of which permits approaching the solution of a number of practical problems in regulating the moisture content of the soil.--Copyright 1975, Biological Abstracts, Inc.
W78-00476

2H. Lakes

FINITE ELEMENT APPROACH TO WAVES DUE TO LANDSLIDES,
Thessaloniki Univ., Salonika (Greece). Faculty of Technology.
For primary bibliographic entry see Field 8B.
W78-00076

PASSIVE REMOTE SENSING OF PHYTOPLANKTON VIA CHLOROPHYLL ALPHA FLORESCENCE,
Department of the Environment, Victoria (British Columbia). Inst. of Ocean Sciences.
For primary bibliographic entry see Field 7B.
W78-00090

FEEDLOTS AND RECREATION LAKES: AN EXAMPLE OF HOW THEY CAN BE GOOD NEIGHBORS,
Agricultural Research Service, Lincoln, NE.
For primary bibliographic entry see Field 5G.
W78-00123

DECOMPOSITION OF AQUATIC BIOTA AND SEDIMENT FORMATION: ORGANIC COMPOUNDS IN DETRITUS RESULTING FROM MICROBIAL ATTACK ON THE ALGA CERATIUM HIRUNDINELLA,
Freshwater Biological Association, Ambleside (England).
For primary bibliographic entry see Field 5C.
W78-00218

THE INFLUENCE OF EXTREMELY HIGH CONCENTRATIONS OF INORGANIC P AT VARYING PH ON THE GROWTH AND PHOTOSYNTHESIS OF UNICELLULAR ALGAE,
Copenhagen Univ. (Denmark). Freshwater Biological Lab.
For primary bibliographic entry see Field 5C.
W78-00222

DEVELOPMENT OF THE MUD HABITAT DURING THE FILLING OF TOO NEW LAKES,
Newcastle-upon-Tyne Univ. (England). Dept. of Zoology.
For primary bibliographic entry see Field 2J.
W78-00228

OBSERVATIONS ON SOME INTERESTING FRESHWATER ALGAE FROM THE NETHERLANDS,
Vrije Univ., Amsterdam (Netherlands). Afdeling Plantensystematiek.
For primary bibliographic entry see Field 5C.
W78-00230

A COMPARATIVE SURVEY OF PETROLEUM HYDROCARBONS IN LAKE SEDIMENTS,
Washington Univ., Seattle. Dept. of Chemistry; and Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W78-00233

A CARBON FLOW MODEL OF EPIPELIC ALGAL PRODUCTIVITY IN ALASKAN TUNDRA PONDS,
North Carolina State Univ. at Raleigh. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W78-00235

ENVIRONMENTAL CONTROL OF PRIMARY PRODUCTIVITY IN ALASKAN TUNDRA PONDS,
North Carolina State Univ. at Raleigh. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W78-00237

RELATIONSHIPS BETWEEN THE PHYTOPLANKTON AND THE ZOOPLANKTON IN THE RESERVOIRS OF THE KARST REGION IN CROATIA, (IN SERBO-CROATIAN),
For primary bibliographic entry see Field 5C.
W78-00238

PRODUCTIVITY OF EPIPELIC ALGAE IN TUNDRA PONDS AND A LAKE NEAR BARROW, ALASKA,
North Carolina State Univ. at Raleigh. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W78-00239

SOME CHARACTERISTICS OF HYDRILLA TUBERS TAKEN FROM LAKE OCKLAWAHA DURING DRAWDOWN,
Florida Univ., Gainesville. Dept. of Agronomy.
For primary bibliographic entry see Field 5G.
W78-00248

RESPONSE OF EURASIAN WATERMILFOIL TO SUBFREEZING TEMPERATURES,
Tennessee Valley Authority, Muscle Shoals, AL. Environmental Biology Branch.
For primary bibliographic entry see Field 5G.
W78-00249

AN ECOLOGICAL STUDY OF THE SWANPOOL, FALMOUTH: II. HYDROGRAPHY AND ITS RELATION TO ANIMAL DISTRIBUTIONS,
Bristol Univ. (England). Dept. of Zoology.
For primary bibliographic entry see Field 5B.
W78-00258

ZOOPLANKTON OF BACINSKA LAKES: A CONTRIBUTION TO THE KARSTIC LIMNOLOGY, (IN SERBO-CROATIAN),
Bioloski Inst., Belgrade (Yugoslavia).
A. Zivkovic.
Arh Biol Nauka. 24(3/4), p 141-164, 1972.

Descriptors: *Zooplankton, Karst, Limnology, Lakes, Seasonal, *Thermal stratification, *Chemical stratification, *Oxygen, Crustaceans, Copepods, Daphnia.
Identifiers: Bosmina-longirostris, Copidodiaptomus-steurei, Daphnia-longispina, Diaphanosoma-brachyurum, Filinia-major, Mesocyclops-leuckarti, Pedalia-Mira, Pedalia-oxiurius, *Yugoslavia(Bacinska lakes).

Investigation of zooplankton of the Bacinska Lakes Crnisevo and Ocusa was carried out at season intervals from 1962-1965. Thermal and chemical stratification is obvious in the deepest Bacinska lakes, Crnisevo and Ocusa, whose basins are below sea level, thus representing a cryptodepression. According to the thermal regime, both lakes are subtropical lakes with long summer stagnation, a brief circulation in the winter, intensive variations in annual temperature and a high thermal gradient. Both lakes belong to the calcium hydrocarbonate type, with a low content of electrolytes. The O2 content of the lake water from the surface to the bottom is usually sufficient. Occasionally in autumn a low O2 coefficient occurs as a consequence of long summer stagnation. In the zooplankton, 37 spp. of Rotatoria were observed. Besides the species of wide distribution, 3 freshwater-brackish species were also found: Pedalia oxiurius, P. mira and Filinia major, which are characteristic for Crnisevo Lake. Among 6 typical limnetic species of Cladocera, the most frequent are: Daphnia longispina, Bosmina longirostris and Diaphanosoma brachyurum, while among Copepoda the most frequent are Mesocyclops leuckarti and Copidodiaptomus steueri. Very pronounced vertical distribution of zooplankton is caused by thermal and chemical stratification. Most frequently the zooplankton is concentrated in the metalimnion (i.e. from 5-15 m). The production of zooplankton expressed as average numerical values varies in the Crnisevo Lake from 31-164 individuals/l. Maximum production occurs either in spring or in autumn; the minimum occurs in winter. In Ocusa Lake the maximum development of zooplankton occurs in a hot and dry period (from 92-372 individuals/l) while the minimum is in the rainy period (from 0-5 individuals/l). The lakes can be characterized as oligotrophic. However, this oligotrophic type has specific, regional properties which are characteristic for the semiarid, mediterranean area of the Dinaric karst.--Copyright 1975, Biological Abstracts, Inc.
W78-00340

ON THE RELATION BETWEEN FISH FAUNA AND ZOOPLANKTON COMPOSITION IN NORTH SWEDISH LAKES,
Institute of Freshwater Research, Drottningholm (Sweden).
N.-A. Nilsson, and B. Pejler.
Inst Freshwater Res Drottningholm Rep. 53, p 51-77, 1973.

Descriptors: *Zooplankton, Lakes, *Predation, *Crustaceans, Daphnia, Fish, Trout, Perches, Pikes, Fish food organisms.
Identifiers: Bosmina longirostris, Ceriodaphnia quadrangula, Daphnia cristata, Daphnia galeata, Daphnia longispina, Heterocope appendiculata, Heterocope saliens, *White fish, *Sweden, Char lakes.

Fish predation appears to be the ultimate factor governing the presence or absence of certain crustaceans species. Daphnia longispina and Heterocope saliens dominate barren lakes or lakes with char or white fish and is replaced by the smaller more transparent D. galeata. Likewise, H. saliens is replaced by the smaller, less conspicuously colored H. appendiculata. In whitefish lakes, the smallest species, D. cristata, Ceriodaphnia quadrangula and Bosmina longirostris are predominant. The zonation of fish species from arctic highlands to the Baltic coast follow the sequence: barren lakes--allopatric trout or char lakes--sympatric trout and char lakes--whitefish lakes with pike, perch and 'coarse fish'. The competitive replacement of arctic char by whitefish occurs at an early stage when all species are planktivorous. The most recently introduced species appears to select the largest and most readily available prey. However, the introduction of planktivorous fish does not inevitably lead to complete extinction of the crustacean fauna; the species simply becomes sufficiently rare as to escape sampling. The rapid exchange of large-sized for small-sized species suggests that the latter were already present in small numbers or 'in refugia', before invasion.--Copyright 1975, Biological Abstracts, Inc.
W78-00372

ASPECTS OF THE LIMNOLOGY OF LAKE TALI KARNG, VICTORIA,
Avondale Coll., Cooranbong (Australia). Dept. of Science.
B. V. Timms.
Aust J Mar Freshwater Res. 25(2), p 273-279, 1974.

Descriptors: *Australia, Lakes, *Limnology, *Salts, *Acidic water, Dissolved solids, *Detritus, *Bottom sediments, *Zooplankton, Muds, Benthos.
Identifiers: Calamoecia-ampulla, Ceriodaphnia-quadrangula, Chara-sp, Chironomus-oppositus, Colubotelson-sp, Litoria-phyllochroa, Micronec-

ta-robusta, Tasmania, Victoria, *Lake Tali Karng(Australia).

Lake Tali Karng, the only deep highland lake in Victoria (Australia), was formed by a landslide. It is 51 m deep and 16.2 ha in area. Lake water is low in total dissolved salts and is slightly acidic. Bottom deposits consist of allochthonous woody detritus in the littoral and sublittoral and of mud of high organic content in the profundal. There are 6 spp. of zooplankton present, including Calamoecia ampulla and Ceriodaphnia quadrangula. Twelve spcies inhabit the littoral zone, which is either rocky or supports weedbeds of Chara sp. Micronecta robusta and tadpoles of Littoria phyllochroa are most abundant. The benthos is dominated by the phraetoicid, Colubotelson sp., and 2 spp. of chironomid in the sublittoral and by Chironomus oppositus in the profundal. Mean benthic biomass is 4.45 g/m2. There is evidence of a biogeographical relationship to highland lakes in Tasmania.--Copyright 1975, Biological Abstracts, Inc.
W78-00387

HYDROCARBON BUDGETS FOR LAKE WASHINGTON,
Washington Univ., Seattle. Dept. of Chemistry; and Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W78-00394

SHAGAWA LAKE RECOVERY CHARACTERISTICS AS DEPICTED BY PREDICTIVE MODELING,
Corvallis Environmental Research Lab., OR.
For primary bibliographic entry see Field 5B.
W78-00417

A MATHEMATICAL MODEL OF POLLUTANT CAUSE AND EFFECT IN SAGINAW BAY, LAKE HURON,
Environmental Research Lab.-Duluth, Gross Ile, MI. Large Lakes Research Station.
For primary bibliographic entry see Field 5B.
W78-00418

MATHEMATICAL MODEL OF PHYTOPLANKTON GROWTH AND CLASS SUCCESSION IN SAGINAW BAY, LAKE HURON,
Environmental Research Lab.-Duluth, Gross Ile, MI. Large Lakes Research Station.
For primary bibliographic entry see Field 5C.
W78-00419

LAKE EUTOPHICATION: RESULTS FROM THE NATIONAL EUTROPHICATION SURVEY,
Corvallis Environmental Research Lab., OR.
For primary bibliographic entry see Field 5C.
W78-00421

METALS IN PLANTS AND WATERS IN THE OKEFENOKEE SWAMP AND THEIR RELATIONSHIP TO CONSTITUENTS FOUND IN COAL,
Governors State Univ., Park Forest South, IL. Coll. of Environmental and Applied Sciences.
For primary bibliographic entry see Field 5B.
W78-00429

POTENTIAL CONTRIBUTION OF ATMOSPHERIC FALLOUT TO THE PHOSPHORUS BUDGET OF COLUMBIA LAKE, CONNECTICUT,
Connecticut Univ., Storrs. Biological Sciences Group.
For primary bibliographic entry see Field 5B.
W78-00438

2I. Water In Plants

THE IMPORTANCE OF ROOT SYSTEMS OF CULTIVATED PLANTS: I. THE INFLUENCE OF THE SOIL WATER CONTENT AND NITROGEN MANURING ON PLANT GROWTH, ROOT MORPHOLOGY, TRANSPIRATION AND NITROGEN ABSORPTION, (IN GERMAN),
Kiel Univ. (West Germany). Inst. fuer Pflanzenbau und Pflanzenzuechtung.
For primary bibliographic entry see Field 3F.
W78-00125

QUANTITATIVE ASSESSMENT OF COMPARATIVE SELECTION OF FOOD ORGANISMS BY FISH, (IN RUSSIAN),
Belorussian State Univ., Minsk (USSR).
E. S. Yurochko.
Vopr Ikhtiol 16(5), p 899-907, 1976.

Descriptors: *Mathematical models, *Fish diets, Ecosystems, Simulation analysis, *Carps, *Fish food organisms.
Identifiers: *Coregonus-peled.

A mathematical model in the form of series makes it possible to achieve comparative assessment under changing dietary conditions for different fish species and size groups. The quantitative indices are also necessary to simulate water ecosystems which is of importance to rational utilization of resources and water reservoirs. The model was tested on pelyads Coregonus peled and carps Cyprinus carpio. --Copyright 1977, Biological Abstracts, Inc.
W78-00176

PHOTOSYNTHESIS IN THE SNOW: THE ALGA CHLAMYDOMONAS NIVALIS (CHLOROPHYCEAE),
Wisconsin Univ.-Madison. Dept. of Bacteriology.
For primary bibliographic entry see Field 2C.
W78-00223

TRANSPIRATION RATE AND SUCTION FORCE OF PLANTS OF PINE FORESTS UNDER DIFFERENT ECOLOGICAL CONDITIONS, (IN BELORUSSIAN),
Akademiya Navuk BSSR, Minsk. Tsentralny Botanichy Sàd.
For primary bibliographic entry see Field 2D.
W78-00334

WATER MITES (HYDRACHNELLAE ACARI) OF THE EIDER RIVER. FAUNISTIC AND BIOECOLOGICAL DATA, (IN GERMAN),
Kiel Univ. (West Germany). Zoologisches Inst.
K. Boettger, and F. Ulrich.
Faunoekol Mitt 4(12-14), p 419-435, 1974.

Descriptors: *Mites, Invertebrates, Rivers, Aquatic insects, Ecological distribution, Seasonal, Growth stages, Sampling.
Identifiers: Eylais-extendens, Hydrachna-globosa, Hydrachnellae, Hygrobates-nigromaculatus, Levertia-inaequalis, Lebertia-porosa, Limnochares-aquatica, Piona-coccinea, Piona-variabilis, *Eider River(West Germany).

From 1967-1970 samples of Hydrachnellae were taken along 3 sections of the Eider, a stream in Schleswig-Holstein (West Germany). These samples yielded 40 spp. belonging to 13 families. Nearly of all them are typical inhabitants of stagnant or slowly flowing waters. Only Lebertia inaequalis, L. porosa and Hygrobates nigromaculatus are also known from faster flowing waters. New data concerning abundance, seasonal occurrence and sex ratios of the different species are given. High variability of systematic characters was found for Hydrachna globosa, Piona coccinea and P. variabilis. Observations concerning oviposition and different developmental stages of several species. Molting stages of Limnochares aquatica and Eylais extendens were found in associations.--Copyright 1976, Biological Abstracts, Inc.
W78-00350

STUDIES ON THE AQUATIC INSECTS IN THE STREAM HOSHIOKI NEAR SAPPORO,
Hokkaido Univ., Sapporo (Japan). Zoological Inst.
T. Okazawa.
J Fac Sci Hokkaido Univ SER Vi Zool 19(2), p 474-488, 1974.

Descriptors: *Aquatic insects, Streams, *Distribution, *Life cycles, Sampling, Diptera.
Identifiers: Baetiella-sp, Baetis-sp, Epeorus-latifolium, Epiophlebia-superstes, Hydropsyche-ulmeri, Mistrophora-inopus, Sapporo, Simulium-japonicum, *Stream Hoshioki(Japan).

The faunal makeup, distribution and life cycles of an insect assemblage in the Stream Hoshioki (Japan) were studied from July 1971-June 1972 by monthly sampling at 3 stations. A total of 82 belonging to 7 orders were collected; Ephemeroptera, Plecoptera, Trichoptera and Diptera comprise in combination, more than 95% of the total number. The distribution and life cycles of 42 spp. are summarized. Most species seem univoltine but Baetis sp., Eperus latifolium, Mistrophora inopus, Simulium japonicum, Baetiella sp. and Hydropsyche ulmeri are bivoltine and Epiophlebia superstes requires more than 1 yr. to complete the life cycle.--Copyright 1976, Biological Abstracts, Inc.
W78-00351

DURATION OF PHOTOSYNTHESIS AS A DIAGNOSTIC INDEX OF THE DEGREE OF DROUGHT-RESISTANCE IN PLANTS,
Patrice Lumumba People's Friendship Univ., Moscow (USSR).
V. M. Malofeev.
S-Kh Biol 11(3), p 373-377, 1976.

Descriptors: *Photosynthesis, *Plant growth, Beans, Cotton, Corn(Field), *Drought resistance, Dehydration.

The reaction of the photosynthetic function in plants (bean, corn, cotton) with experimentally obtained symptoms of xeromorphism and control plants to a sudden dehydration was studied. Dynamics of the intensity of photosynthesis is exposed to 2-stage changes during water loss. There was differential sensitivity in the reaction of the photosynthetic function in xerophyll and control plants under conditions of growing water deficit. The level of the activation of the photosynthetic function (an amplitude and a peak) and the duration of the activated condition can serve as a quantitative criterium of sensitivity.--Copyright 1977, Biological Abstracts, Inc.
W78-00356

STUDY OF WATER CONDITIONS AND DROUGHT RESISTANCE OF PLANTS AS A PROBLEM OF PARTICULAR PHYSIOLOGY, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Inst. Fiziologii Rastenii i Agrokhimii.
I. G. Shmat'ko.
Fiziol Biokhim Kul't Rast 8(3), p 252-256, 1976.

Descriptors: *Drought resistance, *Plant physiology, Wheat, Fruits, Cytological studies.
Identifiers: Millet.

Directions in the study of water conditions and drought resistance of plants (wheat, millet, fruits) on the organism, cellular and subcellular levels are discussed. Effects of unfavorable factors depending on their severity at different periods of ontogenesis are very important. The significance of development of the problem taking into account the biological pecularities of the culture and

variety is emphasized.--Copyright 1977, Biological Abstracts, Inc.
W78-00357

WATER- AND PHOTOSYNTHESIS-RELATIONS OF DESERT PLANTS IN THE SOUTH ALGERIAN SAHARA: III. ANNUAL COURSE AND CONSTITUTIONAL TYPES, (IN GERMAN),
O. Stocker.
Flora (Jena). 163(6), p 480-529, 1974.

Descriptors: *Photosynthesis, *Desert plants, *Transpiration, Evaporation, Respiration, Arid climates, Drought resistance.
Identifiers: Anabasis-aretioides, Limoniastrum-feei, *Sahara desert(Algeria).

In the winter rains climate of the Northern Sahara the photosynthetic production of the investigated perennials has the maximum in the beginning dry season. Later the deterioration of the water potential causes net photosynthesis to sink to negative rates. The restriction of transpiration is limited by the demand of evaporative cooling to stabilize organ temperatures; the daily curves become 'flag like'. Also the respiration is influenced by water stress. Switch-shoot shrubs are well adapted to desert conditions, while malacophyllous ones suffer from the short vegetation period; their leaves have a tendency to persist over the winter. The cusion habit of Anabasis aretioides is of no advantage; the salt secernent succulent Limoniastrum feei is the most resistant species. There is a general tendency to lower the surface development, but to increase the sclerophyllous character and the degree of succulence. The sudano-palaeotropic vegetation of the South-Sahara is more drought resistant with a more stable water balance and greater photosynthetic activity than the mediterranean- and irano-turanian holarctic vegetation of the North-Sahara; the C4-syndrome may be important. (See also W73-13801; W73-13633 and W72-00726)--Copyright 1975, Biological Abstracts, Inc.
W78-00358

SURVIVAL OF THREE GRASS SPECIES AFTER INUNDATION,
Rocky Mountain Forest and Range Experiment Station, Alburquerque, NM.
E. F. Aldon.
USDA Forest Service Research Note RM-344, Fort Collins, Colorado, June, 1977. 2 p, 1 tab, 1 ref.

Descriptors: *Grasses, *Flooding, *Revegetation, *Southwest U.S., Water injury.
Identifiers: *Desert saltgrass(Distichlis stricta), Alkali sacaton(Sporobolus airoides), Western wheatgrass(Agropyron smithii).

Three grass species characteristically found in Southwestern areas that are periodically flooded were studied to determine how long they could remain under water and still survive. Desert saltgrass (Distichlis stricta), alkali sacaton (Sporobolus airoides), and western wheatgrass (Agropyron smithii) were either totally or partially submerged for periods of zero, 3, 6, 12, and 24 days. All three species survived at least 24 days of complete or partial inundation. (Witt-IPC)
W78-00384

DESERT RODENT ABUNDANCE IN SOUTHERN ARIZONA IN RELATION TO RAINFALL,
Texas A and M Univ., Uvalde. Agricultural Research and Extension Center.
F. J. Turkowski, and J. R. Vahle.
USDA Forest Service Research Note RM-346, Fort Collins, Colorado, June, 1977. 4 p, 2 tab, 6 ref.

Descriptors: *Deserts, *Arizona, *Rodents, *Rainfall, *Population, Small animals(Mammals), Mammals, Xerophilic animals, Precipitation(Atmospheric).

Desert rodent populations in southern Arizona fluctuated in rodent numbers and rodent species composition over a 30-year period. Data indicate that the direction of these annual fluctuations can be predicted from the amount of rainfall received during the previous year. (Witt-IPC)
W78-00385

STUDIES ON THE INTESTINAL MICROFLORA OF SALMONIDS: II. EFFECTS OF ARTIFICIAL TRANSPLANTING FROM FRESH WATER INTO SEA WATER ON THE INTESTINAL MICROFLORA OF FEEDING AND NON-FEEDING FISH, (IN JAPANESE),
Hokkaido Univ., Hakodate (Japan). Lab. of Microbiology.
M. Yoshimizu, T. Kimura, and M. Sakai.
Bull Jpn Soc Sci Fish 42(8), p 863-873, 1976.

Descriptors: *Salmonids, *Fish diseases, Microbiology, Sea water, *Fish reproduction, Pseudomonas, Fresh water.
Identifiers: Aeromonas, Oncorhynchus-masou, Vibrio.

Masu salmon (92) (Oncorhynchus masou) which developed silvering were divided into 4 groups; 3 were transplanted from fresh water into sea water. The feeding conditions varied with the group. Viable counts were determined in the intestinal contents or slime of these salmon, in their ambient waters and in their diets. Over 1500 strains were isolated from the above samples. Microbial viable counts in the intestinal contents or slime of the fish transplanted under normal feeding conditions were nearly constant while those which were transplanted without being fed decreased rapidly. This decreasing tendency was found in fresh and sea water reared non-feeding fish. The predominant genus in the intestinal microflora of the fresh water fish was Aeromonas, while in sea water fish it was Vibrio. Upon transplanting the fish from freshwater into sea water, Aeromonas of the terrestrial type was gradually replaced by Pseudomonas as the proportion of sea water in the rearing water increased. This was followed by further replacement by halophilic Vibrio which becan e predominant in the intestinal microflora.--Copyright 1977, Biological Abstracts, Inc.
W78-00439

MICROFLORA OF THE 'SABALO' (PROCHILODUS PLATENSIS, HOLMBERG): II. COMPOSITION AND ACTIVITY OF THE MICROFLORA IN THE SEDIMENTS AND ITS RELATION TO THE NUTRITION OF THE 'SABALO,' (IN SPANISH),
Instituto Nacional de Limnologia, Santo Tome (Argentina).
F. Emiliani, and R. Brandi.
Rev Latinoam Microbiol. 13(4), p 245-248, 1971.

Descriptors: *Bacteria, *Muds, *Microorganisms, Nitrogen cycle, Microbiology, *Fish diseases, Nutrients, Biochemistry, Fish food organisms, *Bottom sediments, Reservoirs.
Identifiers: *Argentina, *Prochilodus-Platensis.

A bacteriological study of the mud in the dam of the Belgrano park (Santa Fe, Argentina) and of the gut content of P. plantensis was made. Culture media based on aqueous extracts obtained from the samples were adequate for the estimation and isolation of the bacterial population. The total number of microorganisms in the mud was rather low; only certain physiological groups in the N cycle were represented; proteolytics and ammonifiers predominated. The denitrification activity was low. The majority of the bacteria occured in the 0-2 cm layer. Comparison of microbiological and chemical analyses suggest that the feeding of the 'sabalo' is selective. Bacteria are not important as food: to obtain 1 g of bacteria the fish must ingest about 100 kg of mud. Their importance in the biochemical activity of the bacteria developing in the intestine after drastic selection has taken place in the anterior part of the gut.--Copyright 1975, Biological Abstracts, Inc.
W78-00452

2J. Erosion and Sedimentation

BED LOAD TRANSPORT BY NATURAL RIVERS,
Rickwoods and Mark Beech, Edenbridge (England).
R. A. Bagnold.
Water Resources Research, Vol 13, No 2, p 303-312, April 1977. 8 fig, 4 tab, 8 ref.

Descriptors: *Sediment transport, *Bed load, *Wyoming, Saltation, On-site data collctions, Rivers, Laboratory tests, Movement, Analytical techniques, Analysis, Evaluation, Scour, Erosion, Traction.
Identifiers: *East Fork River(Wyo), Stream power.

Since stream power, omega, and sediment transport rate, i, are different values of the same physical quantity, namely, the time rate of energy supply and dissipation, it is rational to relate one to the other. The experimental relation has been difficult to interpret because of the spurious curvature of log-log plots in which a constant threshold stream power of zero is involved. The substitution of an excess power (omega - omega sub o) removes this curvature, and existing data on laboratory bed load transport rate measurements i sub b suggest a general empirical relation: i sub b varies with (omega - omega sub o) ((omega - omega sub o)/omega sub o) to the 1/2 power. Existing laboratory data have also shown clearly that at any given value of omega - omega sub o the bedload transport rate decreases as an inverse function of the ratio flow depth to grain size Y/D. The East Fork River (Wyoming) project recently has enabled bed load sampling devices to be calibrated, so reasonably reliable measurements can be made in natural rivers. The uncertainties in the measurement of the corresponding river power were discussed, and a simple data reliability test was suggested. Data covering three seasons collected from both Snake and Clearwater rivers appear to be reliable. Though there is much scatter due to day variations in the river conditions, the data, together with data on an intermediate scale from East Fork River and on a small laboratory scale conform with startling consistency to the following general empirical relation: i sub b/(omega - omega sub o) is approximately equal to ((omega - omega sub o)/omega sub o) to the 1/2 power times (Y/D) to the minus 2/3 power over a 2 million-fold range of stream discharge. (Humphreys-ISWS)
W78-00071

UNIFIED VIEW OF WASH LOAD AND BED MATERIAL LOAD,
Thessaloniki Univ., Salonika (Greece).; and Florida Univ., Gainesville. Dept. of Engineering Sciences.
E. Partheniades.
Journal of the Hydraulis Division, American Society of Civil Engineers, Vol 103, No HY9, Proceedings Paper 13215, p 1037-1057, September 1977. 6 fig, 13 ref, 2 append. NSF GK-31259.

Descriptors: *Bed load, *Suspended load, *Sediment transport, *Model studies, Mathematical models, Suspended solids, Sediments, Streams, Alluvial channels, Particle size, Sands, Silts, Flow, Streamflow, Sedimentology.

Presented in this paper was a new generalized model of flow-sediment interaction. The behavior of the wash load and of the suspended bed-material load can then result as special cases of the new model. The latter follows the lines of Einstein's

original probabilistic model except that interparticle forces of mechanical and physicochemical nature have been introduced and that the flow-induced forces on the individual grains or flocs were assumed to have an upper and lower bound. It was shown that the actual wash load may consist of 2 distinct types of sediment which may coexist: (1) Bed load function for a limited range of flow conditions; whereas above that range it behaves as a wash load; and (2) the other never has a bed load function. It was shown that the latter consists predominantly of silt and clay, i.e., of sediment finer than 0.06 mm, a fact consistently observed in alluvial channels. (Sims-ISWS)
W78-00078

BASIC PRINCIPLES OF RIVER HYDRAULICS,
Alberta Univ., Edmonton. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W78-00080

SEDIMENTS AS SOURCES OF DDT AND PCB,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5B.
W78-00140

CHANGES IN THE GRAIN SIZE OF SEDIMENTS ON THE PALOS VERDES SHELF,
Southern California Coastal Water Research Project, El Segundo.
C. S. Greene.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 91-93, 1977. 1 fig, 1 ref.

Descriptors: *Sediments, *Particle size, *Baseline studies, *Outfall sewers, California, Continental shelf, Resources development, Environmental effects, Water pollution sources.
Identifiers: *Outer continental shelf, Environmental factors, Southern California, Palos Verdes shelf.

In the summer of 1973, the sediments from the Palos Verdes shelf were analyzed for grain-size composition and compared with the findings of Uchupi and Gaal from the period of 1954 to 1959. The greatest increase in clay-sized particles occurred around and downcurrent (to the northwest) of the outfalls and was attributed to an interaction between the organic material originating from the outfalls and fine sediments entering the shelf. A large increase in clay-sized particles on this shelf has been relatively recent and may reflect the addition of new and larger submarine outfalls and a substantial increase in the volume of sewage discharged since the late 1950's. The sediments were resampled and analyzed in the summer of 1975. Results show a dramatic decrease in the clay fraction between 1973 and 1975. These observations suggest that the sediments had been acted on by hydrological forces of sufficient energy to stir the sediments to a depth of several centimeters, allowing a large portion of the clay fraction and a smaller portion of the finer silt fraction to be resuspended and transported away from this area. (See also W78-00134) (Sinha - OEIS)
W78-00146

ESTIMATING BIOAVAILABILITY OF SEDIMENT-BOUND TRACE METALS WITH CHEMICAL EXTRACTANTS,
Geological Surve, Menlo Park, CA. Water Resources Div.
For primary bibliographic entry see Field 5A.
W78-00196

SEDIMENT-TRAP EFFICIENCY OF TORTUGAS ARROYO NEAR LAS CRUCES, NEW MEXICO, WATER YEARS 1963-1974,
Geological Survey, Albuquerque, NM. Water Resources Div.
For primary bibliographic entry see Field 4D.
W78-00199

FLUVIAL SEDIMENT DATA FOR IOWA: SUSPENDED-SEDIMENT CONCENTRATIONS, LOADS AND SIZES: BED-MATERIAL SIZES: AND RESERVOIR SILTATION,
Geological Survey, Cheyenne, WY. Water Resources Div.; and Geological Survey, Iowa City, IA.
For primary bibliographic entry see Field 7C.
W78-00201

LATERAL MIGRATION OF THE MIDDLE SACRAMENTO RIVER, CALIFORNIA,
Geological Survey, Menlo Park, CA. Water Resources Div.
J. Brice.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-271 662, Price codes: A03 in paper copy, A01 in microfiche. Water-Resources Investigations 77-43, July 1977. 51 p, 18 fig, 5 tab, 36 ref.

Descriptors: *Sediment transport, *Channel morphology, *Channel erosion, *Alluvial channels, *Bank erosion, *Vegetation effects, Reviews, Paleohydrology, Baseline studies, Streams, Meanders, *California.
Identifiers: *Middle Sacramento River(Calif), *Vegetation removal effects, *Bank-erosion rate, Stream channel changes.

Rates and processes of lateral erosion were studied for the middle Sacramento River between Chico Landing and Colusa, Calif., a river distance of about 50 miles which is bordered by valuable agricultural land. The study is based on comparison of maps made during 1867-1949 and on aerial photographs made during 1924-74. Meander loops migrate by downstream translation in a direction nearly perpendicular to the loop axis. Loops are cut off by straight or diagonal chutes across the meander neck. The sinuosity of the river has gradually decreased from a value of 1.56 in 1896 to 1.35 in 1974. The morphology and curvature of meander loops cut off before white settlers came to the area indicate that the river was more stable, as well as more sinuous, then than now; subsequent morphologic changes are attributed mainly to the clearing of riparian vegetation and the effects of levees in reducing the area of overflow. The bank-erosion is 1.82 acres per year per stream mile or about 15 feet per year per stream foot for the period 1896-1974. (Woodard-USGS)
W78-00208

DECOMPOSITION OF AQUATIC BIOTA AND SEDIMENT FORMATION: ORGANIC COMPOUNDS IN DETRITUS RESULTING FROM MICROBIAL ATTACK ON THE ALGA CERATIUM HIRUNDINELLA,
Freshwater Biological Association, Ambleside (England).
For primary bibliographic entry see Field 5C.
W78-00218

DISTRIBUTION OF HEAVY METALS IN THE SEDIMENT OF AN UNPOLLUTED ESTUARINE ENVIRONMENT,
Imperial Chemical Industries, Ltd. Brixham (England). Brixham Research Lab.
For primary bibliographic entry see Field 5B.
W78-00224

DEVELOPMENT OF THE MUD HABITAT DURING THE FILLING OF TOO NEW LAKES,
Newcastle-upon-Tyne Univ. (England). Dept. of Zoology.
A. J. McLachlan, and S. M. McLachlan.
Freshwater Biology, Vol. 6, No. 1, February 1976, p. 59-67. 3 fig, 4 tab, 32 ref.

Descriptors: *Mud-water interfaces, *Sediments, *Sedimentation rates, *Paleolimnology, Water chemistry, Insect behavior, Lake stages, Africa, *Lake sediments.
Identifiers: *Lake Chilwa(Malawi), *Lady Burn Laugh Lake(England).

A study was made to illustrate some of the principles of early development of muds in two contrasting lake basins which had no vegetation before they were filled. Lake Chilwa, Malawi (central Africa), a natural lake several thousands of years old, recently refilled after a dry phase; Lady Burn Laugh Lake in northeastern England, an artificially-created lake in temperate latitudes, with less than one ten-thousandth the area of Lake Chilwa. Field and laboratory observations suggest that the appearance of a sediment layer during the filling of the lakes was crucial to the development of communities of mud dwelling animals. The sediment layer formed from the re-arrangement of materials found in the newly flooded lake bottom rather than from introduction of the extraneous matter. Material less than 105 millimicrons in diameter was generated by deposition of silt and clay following mechanical disruption of the newly flooded lake. Material greater than 250 millicicrons diameter was generated by aggregation of fine surface material due to feeding and tube building behavior of the mud-dwelling animals. The major source of ions in both lakes was the lake bottom itself. Release of ions was accelerated by the mechanical disturbance of the mud. The increased concentrations of ions in solution accelerated precipitation of the clays. (Harris-Wisconsin)
W78-00228

A COMPARATIVE SURVEY OF PETROLEUM HYDROCARBONS IN LAKE SEDIMENTS,
Washington Univ., Seattle. Dept. of Chemistry; and Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W78-00233

PROCEEDINGS: LAKE TAHOE RESEARCH SEMINAR III.
Lake Tahoe Area Research Coordination Board, South Lake Tahoe, CA.
For primary bibliographic entry see Field 5G.
W78-00260

EROSION AND SEDIMENT CONTROL TECHNOLOGY,
California State Water Resources Control Board, Sacramento.
For primary bibliographic entry see Field 5G.
W78-00263

REVEGETATION AND EROSION CONTROL AT HEAVENLY VALLEY,
For primary bibliographic entry see Field 5G.
W78-00264

FAUNAL DISTRIBUTIONS IN SOFT SEDIMENTS OF THE SEVERN ESTUARY,
Imperial Coll. of Science and Technology, London (England). Applied Geochemistry Research Group; and Imperial Coll. of Science and Technology, London (England).
For primary bibliographic entry see Field 5B.
W78-00272

PREVENTION OF SAND BAR FORMATION AT OUTLETS INTO THE SEA OR OTHER BODIES OF WATER,
Wijesiriwardena (Don Bernard), Arcadia, CA. (Assignee).
For primary bibliographic entry see Field 8D.
W78-00290

ECOLOGY OF BENTHOS IN A TROPICAL ESTUARY,
Naval Physical and Oceanographic Lab., Cochin (India).
For primary bibliographic entry see Field 2L.
W78-00296

2K. Chemical Processes

VARIATION OF NITRATE VS. PHOSPHATE RATIO IN THE PACIFIC WATER,
Meteorological Coll., Kashiwa (Japan).
For primary bibliographic entry see Field 5B.
W78-00070

GROUND WATER IN THE FRESNO AREA, CALIFORNIA,
Geological Survey, Menlo Park, CA. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-00190

COMPARATIVE EVALUATION OF WATER QUALITY ON THE ST. JOSEPH RIVER (MICHIGAN AND INDIANA, U.S.A.) BY THREE METHODS OF ALGAL ANALYSIS,
California Academy of Sciences, San Francisco. Dept. of Zoology.
For primary bibliographic entry see Field 5A.
W78-00236

THE EFFECT OF FLOODING ON THE AVAILABILITY OF ZINC AND MANGANESE TO RICE,
Commonwealth Scientific and Industrial Research Organization, Glen Osmond (Australia). Div. of Soils.
For primary bibliographic entry see Field 3F.
W78-00337

DISSOLUTION KINETICS OF CARBONATE ROCKS 1. EFFECTS OF LITHOLOGY ON DISSOLUTION RATE,
West Virginia Univ., Morgantown. Dept. of Geology and Geography.
H. W. Rauch, and W. B. White.
Water Resource Research, Vol. 13, No. 2, p 381-394, April 1977. 15 fig, 4 tab, 36 ref. OWRT B-046-PA(3).

Descriptors: *Carbonate rocks, *Solubility, *Laboratory tests, *Pennsylvania, Dolomite, Calcite, Limestones, Karst, Sedimentary rocks, Caves, Geomorphology, Rock properties, Rocks, Carbon dioxide, Water, Chemistry, Hydrogen ion concentration, Karst hydrology, Groundwater, Petrology.
Identifiers: *Dissolution rates.

Laboratory dissolution of Middle Ordovician rock samples from central Pennsylvania was studied at 23C and 1 atm carbon dioxide pressure. Carbonate dissolution rates were compared at 22% bicarbonate saturation with respect to both calcite and dolomite. The results showed that carbonate lithology exerts a strong influence on the dissolution rate and hence, on the degree of cavity development in karst aquifers. The dissolution rate is affected most significantly by dolomite and impurity content. The rate decreases as percentages of dolomite and disseminated insolubles increase. Maximum dissolution rates occur for carbonate rocks with 1.0-2.5% MgO content and with abundant silty streaks. The sparite content is related inversely to cave development but is independent of dissolution rates measured under the laboratory conditions adopted in this study. (Sims-ISWS)
W78-00435

2L. Estuaries

VARIATION OF NITRATE VS. PHOSPHATE RATIO IN THE PACIFIC WATER,
Meteorological Coll., Kashiwa (Japan).
For primary bibliographic entry see Field 5B.
W78-00070

NEW ENGLAND OFFSHORE MINING ENVIRONMENTAL STUDY: THE CHARACTER OF PARTICLE DISPERSION AND WATER MOVEMENT IN MASSACHUSETTS BAY AND ADJACENT WATERS,
National Oceanic and Atmospheric Administration, Miami, FL. Atlantic Oceanographic and Meteorological.
For primary bibliographic entry see Field 5B.
W78-00086

THE EFFECT OF THE SPRING-NEAP TIDAL CYCLE ON THE VERTICAL SALINITY STRUCTURE OF THE JAMES, YORK AND RAPPAHANNOCK RIVERS, VIRGINIA, U.S.A.,
Virginia Inst. of Marine Science, Gloucester Point.
L. W. Haas.
Estuarine and Coastal Marine Science, Vol. 5, No. 4, p 485-496, July 1977. 7 fig, 1 tab, 17 ref. NASA-NGL 47-022-005, RANN GI-38973.

Descriptors: *Estuaries, *Chesapeake Bay, *Virginia, *Salinity, *Tidal effects, Bays, Saline water, Hydrography, Mixing, Stratification, Water circulation, Cycles, Tidal waters, Tides, Water levels, On-site data collections, Analysis, Tidal streams.
Identifiers: *James River(Va), *York River(Va), *Rappahannock River(Va), Spring-neap tidal cycle.

Analysis of salinity data from the lower York and Rappahannock Rivers (Virginia) for 1974 revealed that both of the estuaries oscillated between conditions of considerable vertical salinity stratification and homogeneity on a cycle that was correlated closely with the spring-neap tidal cycle, i.e., homogeneity was developed most highly about 4 days after sufficiently high spring tides, while stratification was developed most highly during the intervening period. The stratification-mixing cycle generally was correlated more closely with the height of high tide than with the magnitude of the tidal range. As a result of the annual cycle in the magnitude of spring high tides, periods of homogeneity were both more numerous and more intense in the late summer than in the winter. Variation in river flow appeared to be of secondary importance in regulating the hydrography of the estuary. Analysis of salinity data collected during the period following Tropical Storm Agnes (July-August 1972) revealed that cycles of stratification and mixing occurred simultaneously throughout the entire salt-influenced lengths of the James, York and Rappahannock Rivers. The cycles were similar to those described above and appeared to be a manifestation of the normal oscillatory nature of the estuaries and not a result of storm related flood waters. (Humphreys-ISWS)
W78-00087

METEOROLOGICAL AND TIDAL EXCHANGES BETWEEN CORPUS CHRISTI BAY, TEXAS, AND THE NORTHWESTERN GULF OF MEXICO,
Texas Univ. at Austin, Port Aransas. Marine Science Inst.
N. P. Smith.
Estuarine and Coastal Marine Science, Vol. 5, No. 4, p 511-520, July 1977. 4 fig, 1 tab, 19 ref.

Descriptors: *Bays, *Gulf of Mexico, *Texas, *Water level fluctuations, Coasts, Tides, Tidal waters, Intertidal areas, Water circulation, Winds, Stress, Analysis, On-site investigations, Meteorology.
Identifiers: *Corpus Christi Bay(Tex), Ekman layers, Spectral analysis, Pressure gradient.

Previous studies conducted along Atlantic and Pacific coastlines suggested that there should be meteorological as well as tidal water level variations in the Gulf of Mexico, and thus long-period exchanges between the inner shelf and the coastal bays. Water level data from Corpus Christi Bay, Texas, collected during a 53-day period in early 1972 were used to obtain a time series of computed Bay volumes. Spectral analysis indicated exchanges occurring primarily at tidal periods and over time intervals longer than about 50 h. Atmospheric pressure data from three locations in south Texas were used to compute regional pressure gradients. Coherence-squared spectra computed from time series of Bay volumes and surface pressure gradient components suggested that meteorologically forced exchanges between the Gulf of Mexico and Corpus Christi Bay are due primarily to Ekman transport across the continental shelf, maintained by quasi-steady winds paralleling the coast, and onshore-offshore winds at periods of 60-100 h. (Humphreys-ISWS)
W78-00088

TRANSPORT OF LOW-SALINITY WATER AT THE SLOPE WATER-GULF STREAM BOUNDARY,
Delaware Univ., Newark. Coll. of Marine Studies.
S. L. Kupferman, and N. Garfield.
Journal of Geophysical Research, Vol. 82, No. 24, p 3481-3486, August 20, 1977. 6 fig, 2 tab, 14 ref. NSF GA-28752, DES74-23680, OCE75-23434.

Descriptors: *Salinity, *Ocean currents, *Atlantic Ocean, Temperature, Water temperature, Thermocline, Conductivity, On-site investigations, On-site data collections, Measurement, Profiles, Buoys, Continental shelf, Circulation, Water circulation, Ocean circulation, Oceans, Oceanography.
Identifiers: *Gulf Stream, *Cape Hatteras, *Low-salinity bands, Water transport, Drogues, Shelf water.

Hydrographic and drogue measurements were used to estimate the transport of shelf water by the freshened water bands at the slope water-Gulf Stream boundary, north of Cape Hatteras. Surface and subsurface bands were observed. Total transport was found to be 40,000 cu m/s. The source of the water for the surface and subsurface bands is the water above and below the shelf thermocline north of Cape Hatteras. The bands carry a significant, perhaps major, fraction of the shelf water passing through the Middle Atlantic Bight. (Sims-ISWS)
W78-00089

PASSIVE REMOTE SENSING OF PHYTOPLANKTON VIA CHLOROPHYLL ALPHA FLORESCENCE,
Department of the Environment, Victoria (British Columbia). Inst. of Ocean Sciences.
For primary bibliographic entry see Field 7B.
W78-00090

ICE NUCLEI IN SEAWATER, FOG WATER AND MARINE AIR OFF THE COAST OF NOVA SCOTIA: SUMMER 1975,
National Oceanic and Atmospheric Administration, Boulder, Co. Atmospheric Physics and Chemistry Lab.
For primary bibliographic entry see Field 2B.
W78-00094

ON THE DYNAMIC BALANCE OF THE CHESAPEAKE BAY WATERS,
National Oceanic and Atmospheric Administration, Princeton, NJ. Geophysical Fluid Dynamics Lab.
A. F. Blumberg.

Chesapeake Science, Vol. 18, No. 3, p 319-323, September 1977. 6 fig, 5 ref. NOAA 04-3-022-33.

Descriptors: *Chesapeake Bay, *Water circulation, *Tides, *Water balance, *Model studies, Mathematical models, Circulation, Tidal waters, Tidal effects, Equations, Computer models, Bays, Estuaries, Bodies of water.
Identifiers: Dynamic balance.

An investigation into the dynamic balance of Chesapeake Bay waters was carried out by means of a two-dimensional, plan view numerical model. The results of the investigation showed that neither the Coriolis force nor the advective terms in the governing vertically integrated equations can be neglected without changing the tidal dynamics and circulation patterns of this Bay. Also, a bottom friction coefficient of 0.0025 produces the most realistic simulations of observed tidal data. (Sims-ISWS)
W78-00095

CALIFORNIA COASTAL PROCESSES STUDY - SKYLAB FINAL REPORT - EPN 492,
Army Engineer District, San Francisco, CA.
D. M. Pirie, and D. D. Steller.
Available from the National Technical Information Service, Springfield, VA 22161 as N76-11528, Price codes: A04 in paper copy, A01 in microfiche. Report EPN-492, June 1975. 74 p, 38 fig, 1 tab, 22 ref. A-85918-A.

Descriptors: *California, *Coastal engineering, *Computer programs, *Sediment transport, *Estuarine environment, *Currents(Water), Ecology, Dredging, Sediment distribution, Remote sensing, Surveys, Photography, Bays.
Identifiers: *Skylab imagery, *San Francisco Bay, Color composites, Interactive image analysis, LANDSAT data.

The Skylab imagery from S-190A, S-190B, and S-192 experiments was analyzed for coastal and estuarine processes for the San Francisco Bay and the Northern California coast. In northern San Francisco Bay, the sediment transport was traced to areas of known deposition. Information from the Skylab imagery interpretation was found to correlate closely with plots of sediment distribution obtained during the same period by boat surveys. Color composite enhancements of S-192 imagery, bands 4, 6 and 7, provided detailed current and sediment transport patterns. Off the Northern California coast, the surface current patterns from the California and Davidson Currents were mapped. The S-190B color photographs provided the most useful information for this study. Close correlation between the Skylab S-190A film/filter combinations and LANDSAT 1 and 2 imagery provided detailed resolution of the study area not possible with LANDSAT alone. (Singh-ISWS)
W78-00096

COASTAL WATER RESEARCH PROJECT ANNUAL REPORT FOR THE YEAR ENDED 30 JUNE 1976.
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5C.
W78-00134

MEASUREMENTS OF SUBTHERMOCLINE CURRENTS,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5A.
W78-00142

CURRENT VELOCITIES REQUIRED TO MOVE SEDIMENTS,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5B.
W78-00143

MERCURY IN SEDIMENTS,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5A.
W78-00145

INITIAL ASSESSMENT OF THE GROUNDWATER RESOURCES IN THE MONTEREY BAY REGION, CALIFORNIA,
Geological Survey, Menlo Park, CA. Water Resources Div.
For primary bibliographic entry see Field 5B.
W78-00188

ESTIMATING BIOAVAILABILITY OF SEDIMENT-BOUND TRACE METALS WITH CHEMICAL EXTRACTANTS,
Geological Surve, Menlo Park, CA. Water Resources Div.
For primary bibliographic entry see Field 5A.
W78-00196

DISTRIBUTION OF HEAVY METALS IN THE SEDIMENT OF AN UNPOLLUTED ESTUARINE ENVIRONMENT,
Imperial Chemical Industries, Ltd. Brixham (England). Brixham Research Lab.
For primary bibliographic entry see Field 5B.
W78-00224

FAUNAL DISTRIBUTIONS IN SOFT SEDIMENTS OF THE SEVERN ESTUARY,
Imperial Coll. of Science and Technology, London (England). Applied Geochemistry Research Group; and Imperial Coll. of Science and Technology, London (England).
For primary bibliographic entry see Field 5B.
W78-00272

SOME FACTORS AFFECTING THE DISTRIBUTION OF ESTUARINE ISOPODS (CRUSTACEA),
University Coll. of Swansea (Wales). Dept. of Zoology.
For primary bibliographic entry see Field 5B.
W78-00275

ADJUSTABLY SUBMERSIBLE BREAKWATER,
For primary bibliographic entry see Field 8B.
W78-00277

PREVENTION OF SAND BAR FORMATION AT OUTLETS INTO THE SEA OR OTHER BODIES OF WATER,
Wijesiriwardena (Don Bernard), Arcadia, CA. (Assignee).
For primary bibliographic entry see Field 8D.
W78-00290

FLOATING BREAKWATER,
For primary bibliographic entry see Field 8B.
W78-00291

ECOLOGY OF BENTHOS IN A TROPICAL ESTUARY,
Naval Physical and Oceanographic Lab., Cochin (India).
C. V. Kurian.
Proc Indian Natl Sci Acad Part B Biol Sci. 38(3/4), p 156-163, 1972.

Descriptors: Ecology, *Benthos, *Estuaries, *Salinity, Tropical regions, *Biomass, *Sediments, Seasonal.
Identifiers: *India, *Polychaetes.

Studies on the benthos of the Cocin (India) backwaters--a typical, tropical, positive estuary--are based on seasonal collections from 30 stations in 10 profiles during 1966-1968. Hydrographical features play an important part in the sedimentation and distribution of fauna at the different stations. Salinity and grade composition of the sediment have the maximum influence on the distribution and abundance of fauna; fine sand with silt harbors the maximum number of macrofauna. The polychaete are present in large numbers at all the stations during all the seasons in spite of the wide changes in salinity. The meiofauna are more numerous in the finer sediments and their abundance is not affected by the tidal changes.--Copyright 1975, Biological Abstracts, Inc.
W78-00296

DEEPWATER DUMPSITE 106 BATHYMETRY AND BOTTOM MORPHOLOGY,
National Marine Fisheries Service, Narragansett, RI. Atlantic Environmental Group.
J. J. Bisagni.
In: NOAA Dumpsite Evaluation Report 77-1, Baseline Report of Environmental Conditions in Deepwater Dumpsite 106, Vol I, Physical Characteristics, p 1-8, June 1977. 5 fig, 3 ref.

Descriptors: *Baseline studies, *Waste disposal, *Bathymetry, *Environmental effects, Oceanography.
Identifiers: *Outer Continental Shelf, *Ocean dumping, Submarine topography, Oceanographic data, Environmental conditions.

During the MAy 1974 characterization cruise to Deepwater Dumpsite 106, a series of 11 camera stations were conducted which covered a portion of the continental slope and upper continental rise. This work was undertaken to better understand the seafloor environment and to provide background information for later manned submersible dives. The boundary between the continental slope and the upper rise, defined here to be at the 2,500 meter bathymetric contour, trends southwest and northeast. The slope of the continental slope area within the dumpsite is approximately 4%, while the slope of the upper continental rise is considerably less, about 1%. In the dumpsite area, the continental slope is dissected by four small canyon systems. This baseline data should serve as a frame of reference for environmental studies. (Sinha-OEIS)
W78-00311

SIX DIVES TO THE LOWER CONTINENTAL SLOPE AND UPPER CONTINENTAL RISE SOUTHWEST OF HUDSON CANYON GEOLOGICAL ASPECTS,
Lamont-Doherty Geological Observatory, Palisades, NY.
B. C. Heezen.
In: NOAA Dumpsite Evaluation Report 77-1, Baseline Report of Environmental Conditions in Deepwater Dumpsite 106, Vol I, Physical Characteristics, p 9-27, June 1977. 16 fig, 1 tab. NOAA-04-5-158-62.

Descriptors: *Continental shelf, *Continental slope, *Baseline studies, *Environmental effects, *Waste disposal, Geology, Currents, Oceanography.
Identifiers: *Outer Continental Shelf, *Ocean dumping, Submarine topography, Continental rise, Environmental conditions.

Three dives were made with D.S.V. ALVIN to the upper continental rise and three dives were made to the lower continental slope during July and August 1975. This report limits consideration to the effects of current on the sea floor and the occurrence of rock exposures. A seismic reflection profile which crossed drill site 108 indicates a several mile wide band where Miocene is close to or at the present sea floor. This suggests that a narrow belt at the base of the continental slope may

have a transitory blanket of hemipelagic ooze which, depending on the strength of the bottom currents, is either deposited or swept away. At the present time the currents seem insufficient to create a major erosional or nondepositional episode. The baseline data should serve as a frame of reference for environmental impact studies. (Sinha-OEIS)
W78-00312

THE GENERAL PHYSICAL OCEANOGRAPHY OF DEEPWATER DUMPSITE 106,
National Marine Fisheries Service, Narragansett, RI. Atlantic Environmental Group.
M. C. Ingham, J. J. Bisagni, and D. Mizenko.
In: NOAA Dumpsite Evaluation Report 77-1, Baseline Report of Environmental Conditions in Deepwater Dumpsite 106, Vol I, Physical Characteristics, p 29-54, June 1977. 11 fig, 3 tab, 15 ref.

Descriptors: *Baseline studies, *Gulf Stream, *Circulation, *Currents, *Environmental effects, Mixing, Waste disposal, *Oceanography.
Identifiers: *Outer Continental Shelf, *Oceanographic data, Slope water, Environmental conditions, Ocean dumping.

The Slope Water has been known to be a region of mixing between Shelf Water and waters of the Gulf Stream. The results obtained by these baseline studies further support this conclusion, by depecting a great amount of variability in the Slope Water also, especially within the upper 400 meters of the water column. Large scale, nonseasonal spatial and temporal variability of temperature and salinity occurring in this region during these baseline studies may be attributed to certain principal processes: anticyclonic Gulf Stream eddies and meanders; mixing across the Shelf/Slope front; and mixing of anticyclonic Gulf Stream eddies and meanders with the Slope water. As concluded from the baseline data, Deepwater Dumpsite 106 should be considered as being within one of the most variable and complex oceanographic regions of the entire western North Atlantic. (Sinha-OEIS)
W78-00313

PHYSICAL OCEANOGRAPHY OF DEEPWATER DUMPSITE 106, UPDATE: JULY 1975,
National Marine Fisheries Service, Narragansett, RI. Atlantic Environmental Group.
J. R. Goulet, Jr., and K. A. Hausknecht.
In: NOAA Dumpsite Evaluation Report 77-1, Baseline Report of Environmental Conditions in Deepwater Dumpsite 106, Vol I, Physical Characteristics, p 55-86, June 1977. 19 fig, 2 tab, 7 ref.

Descriptors: *Baseline studies, *Environmental effects, Waste disposal, *Oceanography.
Identifiers: *Outer Continental Shelf, Environmental conditions, *Oceanographic data, Physical oceanography, Ocean dumping.

The physical oceanographic conditions encountered in the dumpsite area in July, 1975 are described. Cruise AMC-SP-6-AL-75, 22 July - 4 August 1975, of the ALBATROSS IV was planned as part of the second of three baseline studies of the dumpsite area. Supporting physical oceanographic sampling consisted of XBT drops during the trawling operations and STD lowerings, with sampling bottles, conducted opportunistically. Salinity and dissolved oxygen were determined from all the sampling bottles and four bottles on each lowering were equipped with reversing thermometers. Temperature, salinity, and dissolved oxygen data were thus obtained as a calibration check on the corresponding sensors of the STD. The horizontal distribution of XBT drops and STD lowerings, though not uniform, was adequate to obtain a good characterization of physical oceanographic conditions. (Sinha-OEIS)
W78-00314

CLIMATIC STUDY OF NEW YORK BIGHT,
National Climatic Center, Asheville, NC.
For primary bibliographic entry see Field 2B.
W78-00316

APPENDIX, (NOAA DUMPSITE EVALUATION REPORT),
National Marine Fisheries Service, Washington, DC. National Systematics Lab.
For primary bibliographic entry see Field 5E.
W78-00331

DISTRIBUTION OF LARVAL TABANIDAE (DIPTERA) IN A SPARTINA ALITERNIFLORA SALT MARSH,
North Carolina State Univ. at Raleigh. Dept. of Entomology.
J. C. Dukes, T. D. Edwards, and R. C. Axtell.
J Med Entomol. 11(1), p 79-83, 1974.

Descriptors: *Diptera, *Salt marshes, *Distribution, Larvae, Soils, Vegetation.
Identifiers: Chrysops-Fuliginosus, *Spartina-Alterniflora, *Tabanidae, Tabanus-Nigrovittatus.

Larvae of Chrysops fuliginsus Wiedemann and Tabanus nigrovittatus Macquart were recovered from the soil of a regularly flooded salt marsh having S. alterniflora Loisel (smooth cordgrass) as the dominant vegetation. The larvae were found throughout the sampling area with no consistently greater abundance adjacent to a natural drainage ditch. The larvae were found about as frequently in areas of 'tall' as in 'short' S. alterniflora.--Copyright 1974, Biological Absrtracts, Inc.
W78-00339

DISSOLVED AND PARTICULATE TRACE METALS IN THE RHINE ESTUARY AND THE SOUTHERN BIGHT,
Nederlands Inst. voor Onderzoek der Zee, Texel.
For primary bibliographic entry see Field 5B.
W78-00344

SOME PHYSICAL, CHEMICAL, AND MICROBIOLOGICAL CHARACTERISTICS OF TWO BEACHES OF ANGLESEY,
University Coll. of North Wales, Bangor. Dept. of Marine Biology.
For primary bibliographic entry see Field 5B.
W78-00375

MAN'S IMPACT ON ESTUARINE SEDIMENTATION,
State Univ. of New York at Stony Brook.
For primary bibliographic entry see Field 5G.
W78-00392

HEAVY METALS IN THE DERWENT ESTUARY,
Tasmania Univ., Hobart. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W78-00393

BIOLOGICAL TRANSPORT OF ZINC-65 INTO THE DEEP SEA,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 5B.
W78-00395

DISTRIBUTION AND TEMPERATURE ADAPTATION IN THE TELEOST FISH GENUS GIBBONSIA,
San Francisco State Univ., CA. Dept. of Biology.
For primary bibliographic entry see Field 5B.
W78-00399

STRUCTURAL ANALYSIS OF STRESSED MARINE COMMUNITIES,
Corvallis Environmental Research Lab., OR.
For primary bibliographic entry see Field 5C.
W78-00409

TRACE METALS IN THE OCEANS: PROBLEM OR NO,
Environmental Research Lab., Narragansett, RI.
For primary bibliographic entry see Field 5B.
W78-00410

PERSISTENCE IN MARINE SYSTEMS,
Environmental Research Lab., Narragansett, RI.
For primary bibliographic entry see Field 5B.
W78-00411

MONITORING THE ENVIRONMENT FOR ECOLOGICAL CHANGE,
Washington Univ., Seattle. Dept. of Biostatistics.
For primary bibliographic entry see Field 5B.
W78-00422

THE DYNAMICS OF BIOLOGICALLY AVAILABLE MERCURY IN A SMALL ESTUARY,
Hawaii Univ., Honolulu. Dept. of Zoology and Water Resources Research Center.
For primary bibliographic entry see Field 5B.
W78-00430

INVESTIGATIONS ON THE PHYTOPLANKTON OF THE NORTHERN CENTRAL ATLANTIC: II THE PHYTOPLANKTON IN THE SEA AREA OFF NORTH WEST AFRICA TO THE NORTH OF CAP BLANCO, (IN GERMAN),
Rostock Univ. (East Germany). Dept. of Biology.
E. Kuehner, and H. Kurth.
Wiss Z Univ Rostock Math-Naturwiss Reihe 22(10), p 1165-1168, 1973.

Descriptors: *Phytoplankton, *Diatoms, *Atlantic Ocean, Cytological studies, Oxygen, *Nutrients, Nitrates, Phosphates, Africa, Coasts.
Identifiers: *Northwest Africa(Cap Blanco).

Investigations of the phytoplankton to the north of Cap Blanco show that nutrient-rich water has risen in the area covered by 3 southern stations and that this upwelling process is still continuing. Due to the new water, the number of phytoplanktonic organisms did not exceed 170,000 cells/l. The phytoplankton developed strongly (up to 875,000 cells/l) in the areas covered by the central and northern stations. The O2 content rose noticeably and the NO3 and PO4 values dropped. The phytoplankton consisted mainly of diatoms.--Copyright 1976, Biological Abstracts, Inc.
W78-00472

POSSIBILITIES OF INTERPRETING AERIAL PHOTOGRAPHS WHEN MAPPING THE SHORE ZONE AND SUBMERSAL PLANT SOCIETIES IN WATERS WITH A LOW DEPTH OF VISIBILITY, (IN GERMAN),
Deutsche Akademie der Landwirtschaftswissenschaften zu Berlin, Eberswalde (East Germany). Inst. fuer Forstwissenschaften.
Wiss Z Univ Rostock Math-Naturwiss Reihe 22(10), p 1135-1140, 1973.

Descriptors: *Aerial photography, *Mapping, *Vegetation, Submerged aquatic plants, Plant grouping, Aquatic plants.
Identifiers: Darss southern area(E Germany).

The possibility of using aerial photography for rationalizing and increasing the precision of work regarding the vegetation of the chain of shallow inlets to the S of Darss (East Germany) was investigated. Optimum photographic conditions were determined for these waters with an extreme-

ly low depth of visibility during an experimental photographic flight, the best information being provided by aerial photographs using Orwochrom emulsion type UT 18 with a scale of 1:2300. The available photographs permit sure interpretation of the principle community in the submersal area and the shore zone, differences in degree of coverage and increased precision when mapping the borders and determining area.--Copyright 1976, Biological Abstracts, Inc.
W78-00482

LIST OF ENERGY EQUIVALENTS FOR AQUATIC ORGANISMS WITH SPECIAL REGARD TO THE BALTIC SEA, (IN GERMAN),
Rostock Univ. (East Germany). Dept. of Biology.
M. Kreuzberg, and J. A. Von Oertzen.
Wiss Z Univ Rostock Math-Naturwiss Reihe 22(10), p 1153-1158, 1973.

Descriptors: Aquatic animals, *Energy, *Trophic level, *Brackish water, Sea water, Marine animals.
Identifiers: *Baltic Sea.

Energy equivalents obtained by different methods and found in the literature for marine and limnic species and some data from the authors relating especially to brackish water forms are ordered according to the main trophic stages in a list which is to be continued later.--Copyright 1976, Biological Abstracts, Inc.
W78-00485

PRIMARY PHYTOPLANKTON PRODUCTION IN THE WATERS OF THE SHALLOW INLETS TO THE SOUTH OF THE DARSS ZINGST PENINSULA DURING 1972 TAKING THE RESULTS OF A SYNOPTIC INVESTIGATION INTO SPECIAL CONSIDERATION, (IN GERMAN),
H. Huebel.
Wiss Z Univ Rostock Math-Naturwiss Reihe 22(10), p 1101-1104, 1973.

Descriptors: *Phytoplankton, *Primary productivity, Inlets(Waterways), *Salinity, Peninsulas, Trophic level, *Radiation, Synoptic analysis.
Identifiers: *Darss Zingst peninsula(E Germany).

Daily fluctuations in primary production and its dependence on external factors (available radiation, salinity) were investigated at 3 stations during the synoptic investigation in 1972. The primary production maximum was located in the surface layer in the shallow inlets (East Germany) during the investigations. The trophogenic layer was restricted to not more than 110 cm. The results are compared with those obtained at 6 stations spread over the whole chain of shallow inlets (May-Dec., 1972).--Copyright 1976, Biological Abstracts, Inc.
W78-00486

SHORT TERM FLUCTUATION IN THE PHYTOPLANKTON VOLUME AT THE END OF MAY/BEGINNING OF JUNE, 1972, IN THE WATERS OF THE SHALLOW INLETS TO THE SOUTH OF DARSS (SOUTH BALTIC), (IN GERMAN),
Rostock Univ. (East Germany). Dept. of Marine and Fishery Biology.
V. Kell.
Wiss Z Univ Rostock Mathnaturwiss Reihe 22(10), p 1105-1110, 1973.

Descriptors: *Phytoplankton, *Hydrography, Correlation analysis, Coasts, Inlets(Waterways).
Identifiers: *Baltic Sea, *Darss coastal area(East Germany).

Short term fluctuations in the volume of phytoplankton are related to the hydrographical situation. Although the correlation between the phytoplankton and the hydrography is always visible at Station 1 (entrance to the shallow inlet), short term hydrographic changes are no longer reflected by the phytoplankton at the stations located further within the shallow inlets (East Germany).--Copyright 1976, Biological Abstracts, Inc.
W78-00487

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

COMPARATIVE ECONOMICS OF FREEZING PROCESSES AS BRINE CONCENTRATORS,
Fluor Engineers and Constructors, Inc., Irvine, Calif.
P. J. Schroeder, A. R. Khan, and S. F. Mulford.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 318, Price codes: A05 in paper copy, A01 in microfiche. Final Report, June 1977. 79 p, 21 fig, 19 tab, 7 ref. OWRT/SW-77-5, OWRT 14-30-7507.

Descriptors: *Freezing, *Economics, Evaluation, *Design, *Design criteria, *Design standards, *Brines, *Cost estimates, *Evaporators, Costs.
Identifiers: *Brine concentrators.

Recent general awareness of the environment and imposition of Federal Pollution Control Laws have created a need for low cost waste water concentrators. Probably the best commercially available brine concentrator is marketed by the Resources Conservation Company (RCC). This brine concentrator is a vertical tube vapor compression evaporator using the calcium sulfate seeding technique to prevent scale formation. Freezing processes as brine concentrators have the potential of concentrating waste brine to solid salt at a much lower overall cost than RCC Brine Concentrator. Conceptual designs and cost estimates were prepared for 225,000 gallon per day freezing process concentrators for four brines. Estimated, capital, concentration, and salt removal costs are compared. The freezing process appears to be technically feasible, and economically viable, but requires development and demonstration. (OWRT)
W78-00001

STATE-OF-THE-ART SURVEY AND ECONOMIC COMPARISON OF FREEZING PROCESSES.
Office of Water Research and Technology, Washington, D.C.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 298, Price codes: A04 in paper copy, A01 in microfiche. Final Report, December 1976. 65 p, 7 fig, 7 tab, 45 ref. OWRT T-0004(No. 6703)(1), 14-34-0001-6703.

Descriptors: *Reviews, *Desalination processes, Freezing, Flash freezing, Crystallization, Supercooling, Refrigeration, Tertiary treatment, Water treatment.
Identifiers: *Technology transfer, *Freezing processes.

Freezing processes are potentially the least costly and most reliable of desalting processes. Though development has continued for nearly 25 years, no commercial plant exists. The causes for this status as well as feasible processes are discussed. The advantages of freezing are enumerated along with a discussion of the problems associated with its development and are defined in relation to freezing as a general process. Specific problems of individual processes are also enumerated. The arguments for the low cost economic potential are presented. Areas requiring further research and development are defined and a time phased program is suggested.
W78-00003

NEED FOR NEW AND BETTER MEMBRANES,
Office of Water Research and Technology, Washington, D.C. Membrane Processes Div.
K. C. Channabasappa.
(1976). 41 p. 11 fig, 9 tab, 13 ref.

Descriptors: *Membrane processes, *Reverse osmosis, *Waste treatment, *Technology, By products, Membranes, Industrial wastes, Organic wastes, Chemical wastes, Pulp wastes, Sulfite liquors, Water reuse, Desalination processes, Desalination, Brackish water, Food processing industry, Iron, Steel, Costs, Reviews, Municipal wastes, Water supply.
Identifiers: Food processing.

Preparation of wastes and polluted waters for reuse requires treatment for removal of inorganic and organic contaminants released to the water in its prior use. Conventional water and waste treatment techniques are inadequate and uneconomical for preparing poor quality waters for reuse as municipal, industrial, and agricultural water supplies. Since water purification basically involves solute-solvent separation, reverse osmosis membrane technology offers considerable promise as a water and waste treatment technique. The present technology membranes, primarily developed for desalination of brackish waters and sea waters, have restricted chemical and thermal stability and are highly susceptible to fouling with colloidal inorganic and organic contaminants normally present in water supplies. New and improved membranes that do not have the above limitations are very much needed to improve the economics of rev se osmosis technology for water reuse application. (Humphreys-ISWS)
W78-00069

BUFFERING AGENTS,
Aerojet-General Corp., El Monte, CA. (Assignee).
A. Katzakian, Jr., and D. O. DePree.
U.S. Patent No. 4,028,234, 10 p, 2 fig, 1 tab, 5 ref; Official Gazette of the United States Patent Office, Vol 959, no 1, p 300-301, June 7, 1977.

Descriptors: *Patents, *Water treatment, *Water purification, *Demineralization, *Desalination, Waste water treatment, Brackish water, Separation techniques, Ion exchange, Resins.
Identifiers: *Buffering agents.

This invention allows the efficient use of weak acid cation and weak base anion exchange resins in a separated, fixed-bed or moving bed, both current and countercurrent configurations for the purpose of removing salts from brackish and waste water streams. The process minimizes expenditures for chemical by recycling all reagents required in the process and otherwise limited reagent losses. The process comprises the steps of passing the feed stock through a weak cation resin buffered with at least one member of a particular class of hydroxyl-substituted organic amines and exchanging the cations of the feed for the buffer and releasing buffered salts. The released buffered salts are then passed through a bed of weak anion exchange resin to remove the anions releasing the buffer. The released amine buffer is then deposited on a further bed of weak cation exchange resin which when loaded is used as the first bed of the next demineralization cycle while the first bed is regenerated. (Sinha-OEIS)
W78-00281

DRIED SEMIPERMEABLE MEMBRANE AND MANUFACTURE THEREOF,
Mitsubishi Rayon Co. Ltd., Tokyo (Japan). (Assignee).
K. Kamada, and S. Minami.
U.S. Patent No. 4,025,439, 6 p, 5 tab, 11 ref; Official Gazette of the United States Patent Office, Vol 958, no 4, p 1662, May 24, 1977.

Descriptors: *Patents, *Water treatment, *Desalination, *Reverse osmosis, *Membranes,

*Semi-permeable membranes, Permeability, Equipment, Membrane processes.
Identifiers: Manufacturing process.

The use of semipermeable membranes for the desalination of sea water, the desalination of brackish water, the treatment of industrial food industry wastes and the like by reverse osmosis or ultrafiltration is well documented. The selective permeability of the semi-permeable membranes is a very important property in the technology for the separation of solution components by membranes. Especially desired are semi-permeable membranes which inhibit the permeation of a solute but readily permit the permeation of the liquid medium (e.g. water) in the separation process. The object of this invention is to provide a method of manufacturing a polyacrylonitrile semipermeable membrane which is reversible in water by dissolving the polyacrylonitrile or the copolymer in a solvent to prepare a concentrated solution and casting the solution to form a membrane under the conditions of 60-85% relative humidity, immersing the membrane in a non-solvent to remove the solvent and heat-treating the membrane under moist conditions at 50-1/4 - 90-1/4% C and then drying the membrane at a temperature less than the temperature of the heat treatment under conditions such that the coefficient of contraction is less than 1%. (Sinha-OEIS)
W78-00309

3B. Water Yield Improvement

CALCULATION OF EVAPOTRANSPIRATION USING COLOR-INFRARED PHOTOGRAPHY,
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 2D.
W78-00212

METHOD AND APPARATUS FOR CONSERVING SOIL WATER,
D. I. Hillel.
U.S. Patent No 4,027,428, 18 p, 14 fig, 1 tab, 14 ref; Official Gazette of the United States Patent Office, Vol 959, no 1, p 38, June 7, 1977.

Descriptors: *Patents, *Water conservation, *Soil moisture, *Evaporation control, Soil treatment, Soil physical properties, Soil surfaces, Equipment, *Soil water.
Identifiers: Hydrophobic agents, Soil-water relationship.

Natural soil is formed into clods ranging in size from a minimum dimension of about 5 mm to a maximum dimension of about 10 cm, and a hydrophobic agent is applied to the surface of the clods to increase the contact angle of water on the exposed grain surfaces of the clods to an angle greater than 90 degrees, which makes the clods water repellent. The clods thus treated are employed to form the top layer of soil. The treated clods conserve soil water by allowing maximal intake of water and by constituting a barrier which reduces water evaporation. Such soil water conservation together with other advantages enable farming on land in regions which could never before be successfully farmed. An apparatus for forming the treating the clods has a lifting device for lifting the top layer of soil of a field to a screening device for breaking up the soil to have a maximum dimension of about 10 cm and to drop the broken up soil back to the field. A chamber having an open bottom surrounds the screening device, and nozzles direct a spray of liquid hydrophobic agent into the chamber to coat the clods. Alternatively, a blower may direct a powdered hydrophobic agent into the chamber. The screening device may be an apertured continuous belt, continuously moving and vibrating between a pair of horizontal axes, the soil being directed by the lifting device to the upper course of the belt. (Sinha-OEIS)
W78-00276

UNIFORMITY AMONG WEATHER MODIFICATION LAWS,
Arizona Univ., Tucson.
R. J. Davis.
Journal of the Irrigation and Drainage Division, Proceedings of the American Society of Civil Engineers, Vol. 102, No. IR3, Proceedings paper No. 12379, p 285-294, September 1976. 1 tab, 11 ref. OWRT A-064-ARIZ(3).

Descriptors: *Water rights, *Weather modification, Irrigation, Regulation.
Identifiers: *Uniformity, *State laws, *Federal laws, Diversity.

Although there have been efforts to secure uniformity, wide diversity remains among state laws regulating weather modification. Differences stem from ignorance of other states' laws, legal experimentation, different perceptions of weather modification efficacy, and desire to be consistent with local jurisprudence. Uniformity can be achieved through Federal legislation, interstate compacts, and uniform or model state laws. Funding arrangements and administrative structures should vary among the states. Some diversity, mixed with some uniformity, is appropriate for issuing operational permits, allocating weather modification runoff water rights, and determining legal liability. Professional licensing, record keeping, and reporting should be uniformly regulated. Weather modification advocates should support state laws that preserve the strengths of diversity and secure needed uniformity and Federal legislation allowing diversity where it is advantageous. (Bell-Cornell)
W78-00440

3D. Conservation In Domestic and Municipal Use

ESTIMATED USE OF WATER IN THE UNITED STATES IN 1975,
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 6D.
W78-00194

HYDROLOGIC DATA FOR URBAN STUDIES IN THE FORT WORTH, TEXAS METROPOLITAN AREA, 1975,
Geological Survey, Austin, TX. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00209

3E. Conservation In Industry

PHYSICAL AND CHEMICAL METHODS,
Research-Cottrell, Bound Brook, N.J.
For primary bibliographic entry see Field 5D.
W78-00006

ON-SITE CARBON REGENERATION SYSTEM SOLVES EFFLUENT PROBLEM.
For primary bibliographic entry see Field 5D.
W78-00009

RO WATER TREATMENT SYSTEM.
For primary bibliographic entry see Field 5D.
W78-00010

HIGH PURITY PROTEIN RECOVERY,
Viscose Group Ltd., Swansea (Wales).
For primary bibliographic entry see Field 5D.
W78-00023

FRUIT-, VEGETABLE-, AND GRAIN-PROCESSING WASTES, (LITERATURE REVIEW),
Environmental Associates, Inc., Corvallis, OR.
For primary bibliographic entry see Field 5D.
W78-00025

MEAT-, FISH-, AND POULTRY-PROCESSING WASTES, (LITERATURE REVIEW),
Battelle Columbus Labs., OH.
For primary bibliographic entry see Field 5D.
W78-00028

FERMENTATION INDUSTRY, (LITERATURE REVIEWS),
Purdue Univ., Lafayette, IN.
For primary bibliographic entry see Field 5D.
W78-00029

METAL RECOVERY MAKES GOOD SENSE,
Corning Glass Works, NY.
For primary bibliographic entry see Field 5D.
W78-00032

NEW TECHNOLOGY FOR BOILER FEED AT MOBIL,
For primary bibliographic entry see Field 5D.
W78-00039

CHEMICAL RECOVERY SYSTEM CHECKS POLLUTION.
For primary bibliographic entry see Field 5D.
W78-00042

SLUDGE DEWATERING IN TEXTILE PLANTS,
Kendall Co., Griswoldville, MA.
For primary bibliographic entry see Field 5D.
W78-00049

PROSPECTS FOR WATER RE-USE,
Shirley Inst., Manchester (England). Finishing Div.
For primary bibliographic entry see Field 5D.
W78-00050

WASTE WATER TREATMENT AND WATER RECYCLING.
For primary bibliographic entry see Field 5D.
W78-00051

TEXTILE WASTES, (LITERATURE REVIEW),
Talbot (Richard S.) and Associates, Media, PA.
For primary bibliographic entry see Field 5D.
W78-00052

WATER RECYCLING-NO WASTE WATER TO SEWAGE TREATMENT PLANTS (RECYCLING FUER WASSER - KEIN ABWASSER AN KLAERANLAGEN).
For primary bibliographic entry see Field 5D.
W78-00054

ZINC RECOVERY FROM RAYON PLANT SLUDGE,
Avtex Fibers, Inc., Front Royal, VA.
For primary bibliographic entry see Field 5D.
W78-00055

NEW PLANT FILTERS 400 GAL/MIN. OF MINE WATER.
For primary bibliographic entry see Field 5D.
W78-00056

UNIQUE AUTOMATIC WATER-TREATMENT PLANT AT SILVERDALE COLLIERY.
For primary bibliographic entry see Field 5D.

W78-00057

NCB WATER TREATMENT PLANT NEEDS NO LAGOONS.
For primary bibliographic entry see Field 5D.
W78-00058

GUIDE TO WASTEWATER TREATMENT: BIOLOGICAL-SYSTEM DEVELOPMENTS,
Engineering-Science, Inc., Austin, TX.
For primary bibliographic entry see Field 5D.
W78-00062

SCREW PRESS DEWATERING SOLVES COSTLY WASTE DISPOSAL PROBLEM,
Cross Bros. Meat Packers, Inc., Philadelphia, PA.
For primary bibliographic entry see Field 5D.
W78-00105

CHEMICAL TREATMENT OF MEATPACKING PLANT WASTEWATER FROM UNIT OPERATIONS,
Texas Univ. at El Paso. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W78-00167

AMI DESCRIBES HOW MEAT PLANTS HAVE SAVED ENERGY.
American Meat Inst., Washington, DC. Energy Task Force.
Energy Conservation, Case Studies 1-11, 1976, 26 p.

Descriptors: *Cost analysis, *Cost comparisons, *Energy, Analysis, Conservation, Food processing industry.
Identifiers: *Meat packing industry.

The American Meat Institute's energy task force has prepared a series of case studies on energy conservation which describe experiences in existing meat packing plants that may have application to other plants. Each case study is presented in the same six-section format: (1) description, (2) applicability, (3) operations prior to the project, (4) revisions made and operations after installation, (6) comparison of energy and other savings to capital and extra operating costs. (Prodehl - EPA, Corvallis)
W78-00171

ALTERNATIVES TO END-OF-PIPE TREATMENT,
CH2M/Hill, Corvallis, OR.
For primary bibliographic entry see Field 5D.
W78-00172

POULTRY PROCESSOR MEETS CHALLENGE OF INCREASED WASTE LOAD,
Gold Kist, Inc., Atlanta, GA.
For primary bibliographic entry see Field 5A.
W78-00180

STERLING POULTRY PIONEERS PLANT WATER RECLAMATION,
Sterling Poultry Processing Corp., Oakland, MD.
For primary bibliographic entry see Field 5D.
W78-00183

ESTIMATED USE OF WATER IN THE UNITED STATES IN 1975,
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 6D.
W78-00194

INTRODUCTION TO WASTEWATER TREATMENT PROCESSES,
Laval Univ., Quebec.
For primary bibliographic entry see Field 5D.
W78-00360

TREATMENT AND USE OF WASTE EFFLUENT STREAMS,
Lummus Co., New York.
For primary bibliographic entry see Field 5D.
W78-00364

PRODUCTION OF FOOD YEAST FROM SPENT SULFITE LIQUOR,
Boise Cascade Paper Group, Salem, OR.
For primary bibliographic entry see Field 5D.
W78-00365

BIOLOGICAL TREATMENT OF SPENT LIQUOR FROM HIGH-YIELD BISULFITE PULPING OPERATION. PART I,
Consolidated-Bathurst, Ltd., Montreal (Quebec).
For primary bibliographic entry see Field 5D.
W78-00366

BIOLOGICAL TREATMENT OF SPENT LIQUOR FROM HIGH-YIELD BISULFITE PULPING OPERATION. PART II,
Consolidated-Bathurst Ltd., Montreal (Quebec).
For primary bibliographic entry see Field 5D.
W78-00367

QUALITY OF EFFLUENTS FROM VARIOUS MECHANICAL PULPING PROCESSES,
Pulp and Paper Research Inst. of Canada, Pointe Claire (Quebec).
For primary bibliographic entry see Field 5B.
W78-00368

A PROMISING NEW PROCESS FOR REMOVING HEAVY METALS FROM WASTEWATER,
For primary bibliographic entry see Field 5D.
W78-00370

OPTIMIZATION OF WATER MANAGEMENT IN THE PRODUCTION OF WOOD FIBERBOARD USING THE WET PROCESS (K RACIONALIZACII VODNEHO HOSPODARSTVA VO VYROBE DREVOVLAKNITYCH DOSAK MOKRYM SPOSOBOM),
Research and Development Inst. of Wood and Timber, Bratislava (Czechoslovakia).
F. Mytny.
Drevo, Vol 32, No 1, p 8-11, January, 1977. 3 fig, 20 ref.

Descriptors: *Water conservation, *Water management(Applied), *Pulp and paper industry, Water pollution control, Water reuse, Water pollution sources, Dissolved solids, Waste water treatment.
Identifiers: *Fiberboard mills, Closed systems, Board mills.

The first fiberboard-producing plants were designed to use about 10 cu m of water per ton of product. This was gradually reduced to 25-40 cu m/ton on the average, and there are some plants with a fully closed water circuit. The closing of water circuits resulted in substantially higher concentration of dissolved solids in the circuit, reaching 90-100 g/liter compared to 5-6 g/liter in the effluent of an open-circulation plant. The fiberboard plant effluent can be treated using mechanical and biological process stages. (Trubacek-IPC)
W78-00371

REVERSE OSMOSIS AND ULTRAFILTRATION APPLIED TO THE PULP INDUSTRY (OSMOSE INVERSE ET ULTRAFILTRATION APPLIQUEES A L'INDUSTRIE DES PATES),
For primary bibliographic entry see Field 5D.
W78-00377

UDDEHOLM-KAMYR BLEACH PLANT WITH CLOSED WATER SYSTEM (BIELARNIA TYPU UDDEHOLM-KAMYR O ZAMKNIETYM OBIEGU),
Uddeholm A.B., Skoghall (Sweden).
For primary bibliographic entry see Field 5D.
W78-00380

CONTINENTAL (GROUP INC.)'S APPROACH FOR REDUCED PAPER MILL WATER CONSUMPTION AND ITS EFFECT ON ENERGY USE,
Continental Group, Inc., Hodge, LA.
A. L. Boska.
Southern Pulp and Paper Manufacturer, Vol. 40, No. 2, p 17-18, 20, February, 1977. 1 fig, 4 tab.

Descriptors: *Pulp and paper industry, *Water conservation, *Water reuse, Water pollution control, Industrial water, Water pollution sources, Energy, Louisiana.
Identifiers: Paper mills, White water(Paper machine).

After analyzing critical water needs at the Hodge, Louisiana, paper mill, it was concluded that the turpentine condenser water, packing seal water, and cooling water are the critical flows and would not be altered. Most of the plan for water use reduction rested with the paper machine room which consumed 71% of the mill's total water requirements. Water consumption was reduced by 1855 gallons/minute by using incoming cold water for cooling and condensing needs and using heated water from condensers in showers and as makeup water, separating high- and low-pressure condensate return to the power house from machine dryer drainage systems, using white water in the paper machine showers, and utilizing NSSC white water on the pulp showers. (Swichtenberg-IPC)
W78-00381

NEW MILL DESIGN -- A PRESENT DAY APPROACH TO REDUCED WATER USAGE,
Wheelabrator-Frye Inc., Birmingham, AL.
L. E. Doughty.
Southern Pulp and Paper Manufacturer, Vol. 40, No. 2, p 49-52, February, 1977. 8 fig.

Descriptors: *Pulp and paper industry, *Water reuse, Water conservation, Industrial water, Water treatment, Water pollution sources, Water pollution control, *Treatment facilities.
Identifiers: Woodyard, Pulp mill, Paper machine room, Chemical recovery.

Current methods for in-plant water treatment and reuse which would be included in the engineering of a modern pulp and paper mill are reviewed. Opportunities for waste water reuse in the woodyard, pulp mill, machine room, recovery-evaporation area, and causticizer (lime kiln) are described. Problems and problem areas associated with water reuse are identified. (Swichtenberg-IPC)
W78-00382

WHITE WATER INVENTORYING,
For primary bibliographic entry see Field 5D.
W78-00383

PROCESS FOR CLARIFYING (PAPER-)COATING PLANT EFFLUENTS--A CONTRIBUTION TO THE IMPROVEMENT OF ENVIRONMENTAL PROTECTION (VERFAHREN ZUR KLAERUNG VON STREICHEREIABWAESSERN -- BEITRAG ZUR VERBESSERUNG DES UMWELTSCHUTZES),
Feinpapierfabrik Koenigstein VEB (East Germany).
For primary bibliographic entry see Field 5D.
W78-00391

USE OF CHITOSAN FOR THE REDUCTION AND RECOVERY OF SOLIDS IN POULTRY PROCESSING WASTE EFFLUENTS,
Georgia Univ., Experiment. Dept. of Food Science; and Georgia Experiment Station, Experiment.
For primary bibliographic entry see Field 5D.
W78-00457

INDUSTRIAL WASTE PROCESS DESIGN,
Manhattan Coll., Bronx, NY. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W78-00459

CONSERVATION OF WATER IN FOOD PROCESSING BY USE OF LOW VOLUME HIGH PRESSURE SPRAYS,
North Carolina State Univ. at Raleigh. Dept. of Food Science.
A. Hamza, C. Smallwood, Jr., and V. Jones.
Proceedings of the Third National Conference on Complete Water Reuse, June 27 - 30, 1976, p. 546-551, 5 fig, 4 tab, 10 ref.

Descriptors: *Cleaning, *Poultry, *Water conservation, *Hydraulic equipment, *Water utilization, Food processing industry, Water rates, Bacteria, Water quality.
Identifiers: *Poultry processing wastes.

An investigation was undertaken to evaluate the effect of a number of spray parameters on water and energy conservation as measured by bacteria removal during washing. The spray parameters for the studies were studies were water quantity and temperature, nozzle pressure, impingement velocity, nozzle type, and rotation of carcass. Measurement of bacteria washed from the poultry was done via radioactive tagged E. coli. Three commercial nozzles that produced droplets of 50 to 1,000 microns diameter of flat, cone, and swuare spray patterns were selected for study. Nozzle pressures selected were 2.7 atm., 5.4 atm., 10.9 atm., and 17 atm. Water temperatures were 20 degrees, 45 degrees, and 70 degrees. Distances of nozzle from bird were 15, 20, and 25 cm. General formulas are given for the proposed models. Conclusions include: (1) the amount of wash water is the most significant factor in bacteria removal (2) the effect of nozzle pressure improves removal by about 2.5% for each atm., only in the first increment of wash, (3) bacteria removal of 1%/C degrees temperature rise occurs only in the first increment of wash, and (4) high pressures may force bacteria into skin. (Prodehl - EPA, Corvallis)
W78-00460

FULL-SCALE MODIFIED DIGESTION OF MEAT PACKING WASTES,
Wilson and Co., Inc., Chicago, IL. Research and Technical Dept.
For primary bibliographic entry see Field 5D.
W78-00461

AN INVESTIGATION INTO THE DISPOSAL OF BLOOD BY ANAEROBIC DIGESTION,
Kent Sewage Treatment Plant, OH.
For primary bibliographic entry see Field 5D.
W78-00462

POLLUTION ABATEMENT OF POULTRY PROCESSING AND BY-PRODUCTS WASTES,
Rockingham Poultry Marketing Cooperative Inc., Broadway, VA.
For primary bibliographic entry see Field 5D.
W78-00466

PACKINGHOUSE WASTE PROCESSING, APPLIED IMPROVEMENT OF CONVENTIONAL METHODS,
Rath Packing Co., Waterloo, IA.
For primary bibliographic entry see Field 5D.
W78-00469

POLYELECTROLYTES IN INDUSTRIAL WASTE TREATMENT,
Dow Chemical U.S.A., Midland, MI.
For primary bibliographic entry see Field 5D.
W78-00475

THE ECONOMICS OF POOR HOUSEKEEPING IN THE MEAT-PACKING INDUSTRY,
Hormel (George A.), and Co., Chicago, IL.
For primary bibliographic entry see Field 5D.
W78-00481

EQUALIZATION OF LIQUID WASTES,
New Jersey Inst. of Tech., Newark. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5B.
W78-00484

LAND TREATMENT OF FOOD PROCESSING WASTEWATER,
Campbell Soup Co., Camden, NJ.
For primary bibliographic entry see Field 5D.
W78-00494

ENERGY, PUBLIC CHOICES AND ENVIRONMENTAL DATA NEEDS,
Institute of Public Administration, Washington, DC.
For primary bibliographic entry see Field 6G.
W78-00499

3F. Conservation In Agriculture

WATER AND TEMPERATURE REGIME OF THE MAIN TYPES OF SOILS OF THE APSHERON PENINSULA, (IN AZERBAIJANIAN),
For primary bibliographic entry see Field 2G.
W78-00002

AGRONOMIC EFFECTS OF THE LAND DISPOSAL OF WASTES FROM THE AGRICULTURAL AND FOOD INDUSTRIES,
Institut National de la Recherche Agronomique, Versailles (France). Station Centrale d'Agronomie.
For primary bibliographic entry see Field 5E.
W78-00102

WASTEWATER RESEARCH EXPANDS,
For primary bibliographic entry see Field 5E.
W78-00122

THE EFFECT OF FERTILIZERS ON THE WATER CONSUMPTION AND WATER SUPPLY OF SOME FIELD CROPS, (IN HUNGARIAN),
University of Agriculture, Debrecen (Hungary).
L. Ruzsanyi.
Novenytermeles 23(3), p 249-258, 1974.

Descriptors: *Water consumption, *Water supply, *Fertilizers, Crops, Sugarbeets, Leaves, Wheat, Corn(Field), *Crop production.
Identifiers: Lucerne.

Water consumption of winter wheat, maize, sugar beet and lucerne stands were studied over 4 yr, with 3 treatments. Water and fertilizer utilization was the subject of another field experiment, with and without irrigation. The effect of leaf nutrition of plants varied according to species. Leaf area of sugar beet increased in parallel with the growing rates of applications; the leaf area of maize showed almost no reaction. When water consumption and yields were related-water consumption taken as independent variable-an exponential function was obtained. The effect of fertilizer, in water consumption and yield alike was closely linked with leaf surface area. The influence of fertilizers on water utilization (plant product per water used in millimeter) was reflected in the following ranking of crops: sugar beet, winter wheat, lucerne, maize. When the index of water utilization is assessed as based on crop species only, ranking was reversed: maize, lucerne, sugar beet, winter wheat.--Copyright 1976, Biological Abstracts, Inc.
W78-00124

THE IMPORTANCE OF ROOT SYSTEMS OF CULTIVATED PLANTS: I. THE INFLUENCE OF THE SOIL WATER CONTENT AND NITROGEN MANURING ON PLANT GROWTH, ROOT MORPHOLOGY, TRANSPIRATION AND NITROGEN ABSORPTION, (IN GERMAN),
Kiel Univ. (West Germany). Inst. fuer Pflanzenbau und Pflanzenzuechtung.
G. Geisler, and D. Maarufi.
Z Acker Pflanzenbau 141(3), p 211-230, 1975.

Descriptors: *Root systems, *Plant growth, Soil water, *Moisture content, *Nitrogen, Absorption, Transpiration, *Cultivation, Barley, Corn(Field), Soil moisture.

Model experiments with maize and barley with 2 soil water content concentrations within the range between the permanent wilting point and field capacity were considered. The effect of different levels of N fertilization on the effects of water content and correlations between the effects are reported.
W78-00125

ECONOMIC ANALYSIS OF REDUCING PHOSPHORUS LOSSES FROM AGRICULTURAL PRODUCTION,
Cornell Univ. Agricultural Experiment Station, Ithaca, NY. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 5B.
W78-00133

SOIL PROCESSES AND PRODUCTIVITY IN RELATION TO CLIMATIC CYCLES IN KAZAKHSTAN, (IN RUSSIAN),
Akademiya Nauk Kazakhskoi SSR, Alma-Ata. Inst. Pochvovedeniya.
For primary bibliographic entry see Field 2G.
W78-00174

ESTIMATED USE OF WATER IN THE UNITED STATES IN 1975,
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 6D.
W78-00194

FEASIBILITY STUDY FOR IRRIGATING THE TRIBAL FARM ON THE CROW CREEK RESERVATION, FORT THOMPSON, SOUTH DAKOTA,
Roubal (Dana Larson) and Associates, Pierre, SD.
T. C. Werblow, and J. J. Olmsted.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-255 444, Price codes: A04 in paper copy, A01 in microfiche. Engineering Report, 1976. 49 p, 6 fig. OTA 05-06-01566, and DLRA 202475.

Descriptors: *Irrigation, *Feasibility studies, Sprinkler irrigation, Crops, Agriculture, Missouri River, Lakes, Cost analysis, Runoff, Surface runoff, *South Dakota, Federal reservations, *Indian reservations, Groundwater, Water wells.
Identifiers: *Crow Creek Sioux Reservation(Ft. Thompson, SD), Center pivot sprinkler irrigation system, Lake Sharpe(SD).

It is concluded that irrigation is feasible on the 1,400-acre Tribal Farm of the Crow Creek Sioux Reservation located near Fort Thompson, S.D. The proposed irrigated fields are within 2.5 miles of Lake Sharpe on the Missouri River, the recommended source of irrigation water. Dissolved solids in well water and mineral content of ground water limit the usefulness of these sources. Power for the 6,600-gallon/minute pumping station would come through the Missouri River Basin Power System. The topography is gently rolling (1,420 to 1,500 feet elevations), and drainage occurs to the south and east into Lake Sharpe. The semi arid climate produces hot summers and cold winters (0-100 F). Rainfall averages 17 inches per year, with an average growing season of 135 days. Currently dryland farming and grazing are practiced; the principal cash crops are winter wheat and alfalfa. Most of the soils are Lowry, Promise, or Dorna silt loams, which should yield good to excellent crop results with irrigation. The center pivot sprinkler irrigation system is recommended. It has the lowest annual per-acre labor cost ($32), and is most commonly used in the area. Total per-acre construction costs are lower than the side-move tow sprinkler system, and only hydraulic power is needed to move it. Other systems considered required fueled engines. The total estimated project cost is $960, 650, with an annual irrigation cost of $157,200. Four crops are recommended: wheat, alfalfa, grain sorghum, and corn. (Lynch-Wisconsin)
W78-00216

RESPONSE BY PEARL MILLET TO SOIL INCORPORATION OF WATERHYACINTHS,
Florida Univ., Gainesville. Dept. of Soil Science.
For primary bibliographic entry see Field 5G.
W78-00259

IRRIGATION CONTROL APPARATUS,
C. J. M. Ayme de la Chevreliere.
U.S. Patent No. 4,026,467, 3 p, 3 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 958, No 5, p 2014, May 31, 1977.

Descriptors: *Patents, *Irrigation, *Irrigation systems, *Water control, *Irrigation efficiency, Irrigation practices, Application equipment, Electrodes, Soil-water-plant relationship, Humidity.
Identifiers: Drop by drop irrigation.

An improved irrigation control apparatus comprises an assembly electrically controlling the starting and stopping of an irrigation installation through the agency of two electrodes measuring the electrical resistance of the soil. The two electrodes are simulataneously spaced from one another laterally and vertically. The improvement comprises an upper electrode placed at a point which is laterally offset with respect to the axis of symmetry of the bulb formed by drop by drop irrigation, at a distance equal to at least half of the maximum radius of the bulb and situated at the upper limit of the bulb; and a lower electrode placed in a diametrically opposite position, at a point laterally offset in the inverse sense by at least half of the maximum radius of the bulb and situated at the lower limit of the bulb. (Sinha - OEIS)
W78-00268

SPRINKLER SYSTEMS,
Toro Co., San Marcos, CA. (Assignee).
E. J. Hunter.
U.S. Patent No. 4,026,471, 8 p, 7 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 958, No 5, p 2015, May 31, 1977.

Descriptors: *Patents, *Irrigation, *Sprinkler irrigation, *Irrigation efficiency, Flow, Irrigation operation and maintenance, Application equipment.

A sprinkler system has a sprinkler head with a pop-up nozzle actuated by fluid pressure. An impeller is actuated by the fluid flow to rotate the nozzle and thus rotate the spray of fluid. A transmission between the impeller and the nozzle transmits rotation of the impeller to the nozzle. Means are provided for regulating the rate of rotation of the impeller, and then the nozzle, under varying volume flow of fluid being sprayed. This may be accomplished by a substantially constant velocity of incoming fluid impinging on impeller blades. This velocity may be maintained constant velocity of jets of fluid on the impeller blades to rotate them which in turn rotates the nozzle at a substantially constant rate of rotation. (Sinha - OEIS)
W78-00269

HYDRAULIC COEFFICIENTS FOR PE PIPE OF LARGE DIAMETER: STUDIES ON THE PIPE DISTRIBUTION IN SYSTEMS FOR SPRINKLER IRRIGATION: V, (IN JAPANESE),
Okayama Univ. (Japan). Faculty of Agriculture.
For primary bibliographic entry see Field 8B.
W78-00297

IRRIGATION TUBING COUPLING FASTENER,
Du Pont de Namours (E. I.) and Co., Wilmington, DE. (Assignee).
R. B. Duggins, P. G. Mackauf, and D. L. Withington.
U.S. Patent No. 4,024,716, 4 p, 3 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 958, No 4, p 1421, May 24, 1977.

Descriptors: *Patents, *Irrigation, *Subsurface irrigation, *Irrigation practices, *Irrigation efficiency, Irrigation operation and maintenance, Application equipment, Tubing.
Identifiers: Drip irrigation.

A method for irrigating by means of burying expansible porous tubes is known as drip irrigation. Each expansible tube is constructed of two parallel lengths of porous material bound together along the edges. During use expansible tubes may be joined together or to a water pipe via a connecting tube, by inserting the end of the connecting tube into the end of the expansible tube. However in attempting to seal the expansible tube to the connecting tube, there are seams which cause discontinuities on the inner surface of the expansible tube which causes leakage. This invention provides a fastener for joining a connecting tube and an expansible tube telescoped on the end of the connecting tube. The fastener is composed of a compressible ring on the end of the connecting tube and a tubular sheath telescoped on the connecting tube, the expansible tube and the ring. The sheath has an inner surface tapered to a circumference less than the normal circumference of the ring. (Sinha - OEIS)
W78-00299

FOLDING ALUMINUM RICE AND IRRIGATION BOX,
W. D. Hudson, and B. M. Hudson.
U.S. Patent No. 4,024,717, 5 p, 2 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 958, No 4, p 1422, May 24, 1977.

Descriptors: *Patents, *Irrigation, *Irrigation practices, *Surface irrigation, Water delivery, Flow control, Irrigation efficiency, Flooding, Application equipment.

The cultivation of rice and other crops requires the occasional flooding or irrigation of the fields. Rice boxes and similarly constructed irrigation devices are used to provide and regulate water flow throughout numerous fields and between individual fields and checks, levees or ditches. After the rice is harvested, many growers burn the remaining rice stubble to help maintain a good quality rice crop the next planting season. Wooden, steel, and fiberglass rice boxes have deficiencies which impair efficient irrigation. This invention describes a folding box providing lightweight and long life expectancy. The hinged construction enables the box to be folded up or laid out flat for convenience in handling, transportation, storage and repairs. It also allows for damaged part replacement. (Sinha - OEIS)
W78-00300

THE EFFECT OF FLOODING ON THE AVAILABILITY OF ZINC AND MANGANESE TO RICE,
Commonwealth Scientific and Industrial Research Organization, Glen Osmond (Australia). Div. of Soils.
K. G. Tiller, and P. Wassermann.
Z Pflanzenernaehr Bodenkd. 136(1), p 57-67, 1973.

Descriptors: *Flooding, *Zinc, *Manganese, *Rice, Soils, Nutrients, Isotope studies.

The effect of flooding of soils on the availability of Zn and Mn to rice was studied in pot experiments by measuring the isotopic dilution of nutrients absorbed from doubly labelled soils. The results of this procedure were not appreciably affected by incubation for up to 6 wk before planting the rice but were affected by the inclusion of carrier, especially for Zn. Flooding approximately doubled the total amount of available Mn. It only marginally increased available Zn for all soils, yet the plant concentrations of Zn and Mn were sometimes markedly less under flooded conditions. The isotopic dilution procedure confirmed that for non-flooded soils. The mildly reducing procedure of Jones and Leeper (1951) was most appropriate for characterizing total available Mn and showed that a hydroquinone reagent containing EDTA (after Beckwith 1955) promises a more reliable estimate of the total amount of Mn to be released under flooded conditions. The hypothesis is offered that only the exposed monolayer of the manganese oxide surface contributes to the equilibria controlling uptake by plants under non-flooded conditions, and that this fraction is largely reorganized under water-logged conditions such that the underlying manganese oxide surface can also contribute to plant uptake.--Copyright 1974, Biological Abstracts, Inc.
W78-00337

CHANGES IN TEMPERATURE AND AIR HUMIDITY DURING IRRIGATION IN THE DESERT ZONE, (IN RUSSIAN),
Desert Inst., Ashkhabad (USSR).
I. G. Gorbunova, N. S. Orlovskii, and Z. M. Utina.
Probl Osvoeniya Pustyn 6, p 9-14, 1974.

Descriptors: *Air temperature, *Humidity, Deserts, Cotton, *Irrigation, Arid lands, Arid climates.
Identifiers: *USSR, Karakum, Kizylkum, Kazahkstan.

Irrigation of new lands had a decreasing effect on temperature and air humidity rate of the surface layer. During the growth period the average decrease of air temperature in irrigated cotton fields was 1-2 degrees, with the height at 2, and the air humidity increase at 2-4 millibars (mb). Under the plant cover the values were 2.5 degrees and 5-10 mb, respectively. Maximum changes of the meterological factors in the course of irrigation took place in the territory of Central Karakum and Southwestern Kizylkum and minimum in Southern Kazahkstan (USSR).--Copyright 1976, Biological Abstracts, Inc.
W78-00347

DURATION OF PHOTOSYNTHESIS AS A DIAGNOSTIC INDEX OF THE DEGREE OF DROUGHT-RESISTANCE IN PLANTS,
Patrice Lumumba People's Friendship Univ., Moscow (USSR).
For primary bibliographic entry see Field 2I.
W78-00356

STUDY OF WATER CONDITIONS AND DROUGHT RESISTANCE OF PLANTS AS A PROBLEM OF PARTICULAR PHYSIOLOGY, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Inst. Fiziologii Rastenii i Agrokhimii.
For primary bibliographic entry see Field 2I.
W78-00357

LINE SOURCE SPRINKLER FOR CONTINUOUS VARIABLE IRRIGATION-CROP PRODUCTION STUDIES,
Utah State Univ., Logan. Dept. of Soil Science.
R. J. Hanks, J. Keller, V. P. Rasmussen, and G. D. Wilson.
Soil Science Society of American Journal, Vol. 40, No. 3, p 426-429, May-June 1976. 3 fig, 2 tab, 4 ref. OWRT C-5189(No 4233)(2).

Descriptors: *Sprinkler irrigation, Irrigation, *Irrigation systems, Irrigation effects, *Crop production, Crop response, Fertilization.
Identifiers: *Irrigation frequency, Continuous variable.

The design details and a sample set of field test results for a line source sprinkler plot irrigation system are presented. The system produces a water application pattern which is uniform along the length of the plot and continuously, but uniformly variable across the plot. By applying a fertility variable along a plot (at right angles to the water variable) planted in some test crop, the system offers a convenient means for developing crop production function data. The system test area and water supply are both small. However, the application of the system may be limited by wind and all water application levels within a plot must be supplied at the same irrigation frequency. (Skogerboe-Colorado State)
W78-00447

LAND TREATMENT OF FOOD PROCESSING WASTEWATER,
Campbell Soup Co., Camden, NJ.
For primary bibliographic entry see Field 5D.
W78-00494

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

CALCULATORS IN TIMER-COUNTERS FOR CURRENT METERS,
Papuea New Guinea Univ. of Tech., Lae (New Guinea). Dept. of Electrical and Communications Engineering.
For primary bibliographic entry see Field 7B.
W78-00077

A REGIONAL RESERVOIR STORAGE ANALYSIS FOR EASTERN MASSACHUSETTS AND RHODE ISLAND,
Geological Survey, Reston, VA. Water Resources Div.
G. D. Tasker.
In: Journal of the Boston Society of Civil Engineers Section, American Society of Civil Engineers, Vol 64, No 1, p 13-26, April 1977. 6 fig, 4 tab, 16 ref.

Descriptors: *Reservoir storage, *Reservoir yield, *Reservoir releases, *Reservoir design, *Regional analysis, *Massachusetts, *Rhode Island, Flow control, Low-flow augmentation, Water supply, Hydrologic data.

Regionalized relationships between reservoir storage and uniform reservoir outflow resulting from redistribution of natural flow by storage are presented for streams in eastern Massachusetts and Rhode Island. The relationships are given in terms of percent chance that the reservoir would become empty and are based on long-term streamflow records. They take into account seasonal and year to year variations in streamflow by use of hydrologic indices which can be estimated for ungaged sites. The indices are the 7-day, 2-year low flow and the coefficient of variation of annual discharge. (Woodard-USGS)
W78-00195

WATER RESOURCES DATA FOR GEORGIA, WATER YEAR 1976.
Geological Survey, Doraville, GA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00200

WATER RESOURCES DATA FOR NEW YORK, WATER YEAR 1976--VOLUME 1. NEW YORK EXCLUDING LONG ISLAND.
Geological Survey, Albany, NY. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00202

WATER RESOURCES DATA FOR NEBRASKA, WATER YEAR 1976.
Geological Survey, Lincoln, NE. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00203

LOW-FLOW CHARACTERISTICS AT GAGING STATIONS ON THE WISCONSIN, FOX, AND WOLF RIVERS, WISCONSIN,
Geological Survey, Madison, WI. Water Resources Div.
For primary bibliographic entry see Field 5B.
W78-00204

HYDROLOGY OF THE CREEPING SWAMP WATERSHED, NORTH CAROLINA, WITH REFERENCE TO POTENTIAL EFFECTS OF STREAM CHANNELIZATION,
Geological Survey, Raleigh, NC. Water Resources Div.
M. D. Winner Jr., and C. E. Simmons.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-270 926, Price codes: A04 in paper copy, A01 in microfiche. Water-Resources Investigations 77-26, April 1977. 54 p, 20 fig, 11 tab, 15 ref.

Descriptors: *Channeling, *Channel improvement, *Hydrologic budget, *Coastal Plains, *North Carolina, Water quality, Trace elements, Sediment yield, Small watersheds, Base flow, Confined water, Potentiometric level, Hydrogeology, Aquifers, Streamflow, Swamps.
Identifiers: *Creeping Swamp watershed(N C).

Hydrologic data were collected for four years at six sites in the Creeping Swamp watershed in eastern North Carolina in a preliminary effort to study the effects of stream channelization on the hydrology of a small watershed. A water-budget evaluation for pre-channelized conditions showed that runoff accounts for about 17 percent of the total rainfall, base runoff about 20 percent, ground-water outflow about 2 percent, and evapotranspiration about 61 percent. Channelization would have caused the greatest decline in ground-water levels nearest the stream, with the decline diminishing with increased distance from the stream. Channelization would also have resulted in a decrease in overland runoff and an increase in the amount of water reaching Creeping Swamp through the ground-water system, although the total volume of runoff would not change significantly. The water-quality characteristics of Creeping Swamp indicate that the stream is relatively free of pollution, although it is likely that channelization would increase (1) suspended-sediment loads, (2) stream temperatures, and (3) concentrations of dissolved solids, especially during low flows. (Woodard-USGS)
W78-00207

LATERAL MIGRATION OF THE MIDDLE SACRAMENTO RIVER, CALIFORNIA,
Geological Survey, Menlo Park, CA. Water Resources Div.
For primary bibliographic entry see Field 2J.
W78-00208

WATER RESOURCES DATA FOR NEW YORK, WATER YEAR 1976--VOLUME 2. LONG ISLAND.
Geological Survey, Albany, NY. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00210

THE STRUCTURE OF A TURBULENT FLOW IN A CHANNEL OF COMPLEX SHAPE,
Geological Survey, Atlanta, GA. Water Resources Div.
For primary bibliographic entry see Field 8B.
W78-00211

OPTIMAL AERATION POLICIES FOR THE ABATEMENT OF POLLUTION IN RIVER BASINS,
Columbia Univ., New York. Dept. of Mechanical Engineering.; and Columbia Univ., New York. Dept. of Nuclear Engineering.
For primary bibliographic entry see Field 5G.
W78-00213

RESPONSE OF POTAMOGETON PECTINATUS L. TO NORFLURAZON,
Massachusetts Univ., East Wareham. Lab. of Experimental Biology.
For primary bibliographic entry see Field 5G.
W78-00221

THE AQUATIC PLANT REGULATION PROGRAM IN FLORIDA,
Florida Dept. of Natural Resources, Tallahassee. Bureau of Aquatic Plant Research and Control.
For primary bibliographic entry see Field 5G.
W78-00242

POTENTIAL GROWTH OF AQUATIC PLANTS IN THE REPUBLIC OF THE PHILIPPINES AND PROJECTED METHODS OF CONTROL,
Office of the Chief of Engineers (Army), DC. Aquatic Plant Control Program.
For primary bibliographic entry see Field 5G.
W78-00243

SEASONAL PRODUCTION AND GERMINATION OF HYDRILLA VEGETATIVE PROPAGULES,
Florida Univ., Gainesville. Dept. of Agronomy.
For primary bibliographic entry see Field 5G.
W78-00247

DISSIPATION OF RESIDUES OF 2,4-D IN WATER, HYDROSOIL, AND FISH,
Fish and Wildlife, Warm Springs, GA. Fish Pesticide Research Lab.
For primary bibliographic entry see Field 5G.
W78-00251

BIOLOGICAL CONTROL OPERATIONS ON ALLIGATORWEED,
Office of the Chief of Engineers (Army), Washington, DC.
For primary bibliographic entry see Field 5G.
W78-00253

ECOLOGICAL STUDIES OF NEOCHETINA BRUCHI AND N. EICHHORNIAE ON WATER-HYACINTH IN ARGENTINA,
Agricultural Research Service, H Hurlingham (Argentina). Biological Control of Weeds Research Lab.
For primary bibliographic entry see Field 5G.
W78-00254

HOST SPECIFICITY OF NEOCHETINA BRUCHI HUSTACHE (COLEOPTERA CURCULIONIDAE), A BIOLOGICAL CONTROL AGENT FOR WATERHYACINTH,
Agricultural Research Service, Fort Lauderdale, FL. Aquatic Plant Management Lab.
For primary bibliographic entry see Field 5G.
W78-00255

A REVIEW OF METHODS FOR OBTAINING MONOSEX FISH AND PROGRESS REPORT ON PRODUCTION OF MONOSEX WHITE AMUR,
Fish Farming Experimental Station, Stuttgart, AR.
For primary bibliographic entry see Field 5G.
W78-00257

LEGAL REVIEW OF LAND USE CONTROLS,
California Univ., Berkeley.
For primary bibliographic entry see Field 5G.
W78-00262

WATER FLOW METER,
For primary bibliographic entry see Field 7B.
W78-00266

MEASURING DEVICE FOR WATER FLOW IN A BURIED PIPE,
For primary bibliographic entry see Field 7B.
W78-00267

METHOD FOR ADJUSTING AN AUTOMATIC SLUICE WITH A VIEW TO ENSURING A DETERMINED LEVEL,
Societe Generale de Constructions Electriques et Mecaniques (Alsthom), Paris Cedix (France). (Assignee).
For primary bibliographic entry see Field 8C.
W78-00278

PRESSURIZED WATER WHEEL,
W. S. Kerby.
U.S. Patent No. 4,023,915, 7 p, 6 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 958, No 3, p 1147, May 17, 1977.

Descriptors: *Patents, *Waterwheels, Engineering structures, *Water control, Flow, Flow control, Runoff, Watershed management.

A waterwheel assembly has entry and outlet flow directing channel portions and a flow directing member below the waterwheel. The waterwheel has radially placed paddles mounted on arotatable shaft and arranged with spaces between the paddles in open fluid communication in the center portion of the waterwheel. The upper portion of the waterwheel is enclosed in a pressurized air cavity so water is kept in the lower portion of the waterwheel. A method of controlling the water flow in a watershed includes directing water flow through small channels which connect with larger channels with flow controlling waterwheels in the channels at selected location so that releasing water through the waterwheels control water flow and thus regulates runoff in the watershed area. (Sinha - OEIS)
W78-00293

EVALUATION OF THE EFFECTIVENESS OF USING DRAINED STATE FOREST HOLDINGS, (IN RUSSIAN),
M. E. Maiorov.
Vyestsi Akad Navuk Bssr Syer Biyal Navuk 3, p 118-119, 1975.

Descriptors: Soils, *Soil types, *Drainage, *Swamps, Forests, *Forest management, Ecology, Climates.
Identifiers: Belorussian-SSR, USSR.

An analysis was made of the Lyuban Forest in the Minsk district (Belorussian SSR, USSR) which is based on the use of an edaphic-climatic grid. The disposition of soil varieties according to forest vegetation types and the effects of an ecological shift in growing conditions as a result of the draining of swampy areas of the forest are shown.--Copyright 1976, Biological Abstracts, Inc.
W78-00345

WHERE TO FIND WEATHER AND CLIMATIC DATA FOR FOREST RESEARCH STUDIES AND MANAGEMENT PLANNING,
North Central Forest Experiment Station, St. Paul, MN.
For primary bibliographic entry see Field 7C.
W78-00386

ALTERNATIVE MODELS FOR ESTIMATING THE TIME SERIES COMPONENTS OF WATER CONSUMPTION DATA,
Hawaii Univ., Honolulu. Dept. of Agricultural and Resource Economics.
For primary bibliographic entry see Field 6A.
W78-00443

GUIDE TO LAND COVER AND USE CLASSIFICATION SYSTEMS EMPLOYED BY WESTERN GOVERNMENTAL AGENCIES,
Ecology Consultants, Inc., Fort Collins, CO.
S. L. Ellis, C. Fallat, N. Reece, and C. Riordan.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-265 173, Price codes: A09 in paper copy, A01 in microfiche. Publication No. FWS/OBS-77/05, March 1977. 184 p. WELUT No. 004.1-76, FWS 14-16-0008-2123.

Descriptors: *Ecosystems, *Land classification, *Data collections, *Data processing, *Habitats, *Vegetation, Wildlife habitat, Mapping, Habitat types, Canada, Alaska, Arizona, California, Colorado, Idaho, Kansas, Montana, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Texas, Utah, Washington, Wyoming, *Classification.

The guide surveys and lists the classification systems in use by State and Federal agencies in 18 Western States and the Provinces of Alberta and Manitoba in Canada. The guide--limited primarily to wildlife, land use, and terrestrial vegetation--provides summary descriptions of classification systems, and the data base and the techniques required to implement these systems. System descriptions are divided into three sections: local systems, regional and multi-regional systems, plus some Canadian systems. Each system summary includes the title of the system, contact person, objectives, background, description, products and related systems. Author and keywork indexes and a glossary of terms are included. (Fish and wildlife Service)
W78-00496

COOPERATIVE INSTREAM FLOW SERVICE GROUP: THE FIRST YEAR.
Fish and Wildlife Service, Fort Collins, CO. Cooperative Instream Flow Service Group.
Publication No. FWS/OBS-77/36, August 1977. 8 p.

Descriptors: Flows, Hydrology, Water quality, *Streamflow, Research and development.
Identifiers: *Instream flow.

The activities and accomplishments of the Cooperative Instream Flow Service Group during its first year of existence are described. The group, established in July 1976 as a satellite group of the Western Energy and Land Use Team, is a multi-agency multi-discipline organization. Its goal was to establish an entity which could utilize the contributions of different agencies and persons from different disciplines to advance the state-of-the-art and become the center of activity related to instream flow assessments. The group's areas of research include: (1) development of improved methods for assessing and predicting instream flow requirements for fish, wildlife, other aquatic organisms, recreation, and aesthetics; (2) development and improvement of guidelines for implementing instream flow recommendations; (3) establishment of an effective communication network for disseminating instream flow information. (Fish and Wildlife Service)
W78-00497

A DECOMPOSITION APPROACH TO THE CAPACITY EXPANSION PROBLEM,
Case Western Reserve Univ., Cleveland, OH. Dept. of Systems Engineering.
J. A. Craig.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 674, Price codes: A06 in paper copy, A01 in microfiche. MS thesis, June 1976. 118 p. 8 fig, 18 tab, 18 ref, append. OWRT B-050-OHIO(2).

Descriptors: *Systems analysis, *Optimum development plans, *Water supply, *Multiple-purpose projects, Dynamic programming, Simulation analysis, Water resources development, Water allocation(Policy), Planning, Future planning(Projected), Long-term planning, Computer programs, Computer models.

A quantitative model is described for the optimal sequencing of water supply projects constructed to meet a projected demand function, in which there is a need to solve capacity demand computational problems associated with uncertainties in the data. The decomposition approach involves a computer-based program described in the text and utilizes incremental cost considerations to permit effective analysis of systems previously considered dimensionally infeasible. The method results in a substantial reduction of computational time requirements, while maintaining a high degree of accuracy in achieving the optimal solution. With the problem of dimensionality eliminated, the procedure may be applied to a variety of real water resource problems. Examples illustrated in the report include the optimal expansion for a large regional system, and consideration of demand functions for multiple water qualities. It is thought that the most significant application of the approach is for simulation and the generation of alternative solutions and policies, in which an incremental use of the model might generate a set of cost-competitive alternative solutions. (Harris-Wisconsin)
W78-00500

4B. Groundwater Management

WATER TABLE RESPONSE TO A SEQUENCE OF RECHARGES,
South Dakota State Univ., Brookings. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2F.
W78-00072

DEVELOPMENT AND RESORPTION OF A THERMAL DISTURBANCE IN A PHREATIC AQUIFER WITH NATURAL CONVECTION,
Neuchatel Univ. (Switzerland). Centre de Hydrogeologie.
For primary bibliographic entry see Field 5B.
W78-00083

HEAT DISPERSION EFFECT ON THERMAL CONVECTION IN ANISOTROPIC POROUS MEDIA,
Oslo Univ. (Norway). Dept. of Mechanics.
For primary bibliographic entry see Field 2F.
W78-00084

SERIES EXPRESSION FOR THE WELL FUNCTION FOR LEAKY STRIP AQUIFERS,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 2F.
W78-00085

SOLUBLE CATIONS BENEATH A FEEDLOT AND AN ADJACENT CROPPED FIELD,
Agricultural Research Service, Lincoln, NE.
For primary bibliographic entry see Field 5B.
W78-00121

INITIAL ASSESSMENT OF THE GROUNDWATER RESOURCES IN THE MONTEREY BAY REGION, CALIFORNIA,
Geological Survey, Menlo Park, CA. Water Resources Div.
For primary bibliographic entry see Field 5B.
W78-00188

EXPERIMENTAL STUDY OF ARTIFICIAL RECHARGE ALTERNATIVES IN NORTHWEST HILLSBOROUGH COUNTY, FLORIDA,
Geological Survey, Tallahassee, FL. Water Resources Div.
W. C. Sinclair.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-270 953, Price codes: A04 in paper copy, A01 in microfiche. Water-Resources Investigations 77-13, 1977. 52 p, 16 fig, 3 tab, 8 ref.

Descriptors: *Groundwater recharge, *Aquifer characteristics, *Florida, *Artificial recharge, Methodology, Water spreading, Tile drains, Drainage wells, Groundwater movement, Natural recharge, Evaluation.
Identifiers: Northwest Hillsborough County(Fla), *Floridan aquifer, *Connector wells, Groundwater management.

Extensive water withdrawal from the Floridan aquifer in the urban Tampa Bay area has induced leakage from the overlying surficial aquifer adversely effecting the water table and lake levels. Artificial recharge could reduce the impact of these effects. Four experiments were conducted to investigate possible recharge alternatives; sinkhole recharge, water-spreading, connector wells, and subsurface-tile drainage to a deep well. Experiments indicate that all four methods can be effective. However, the sink-hole recharge experiment moved the greatest volume of water into the Floridan aquifer. The drain-tile experiment indicated greatest potential for draining the surficial aquifer. Combinations of the four methods could be used where potential exists for downward movement of water and sufficient unsaturated aquifer for water storage. (Woodard-USGS)
W78-00189

GROUND WATER IN THE FRESNO AREA, CALIFORNIA,
Geological Survey, Menlo Park, CA. Water Resources Div.
K. S. Muir.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-270 964, Price codes: A03 in paper copy, A01 in microfiche. Water-Resources Investigations 77-59, June 1977. 22 p, 6 fig, 2 tab, 21 ref.

Descriptors: *Groundwater availability, *Aquifer characteristics, *Water utilization, *Water quality, *California, Withdrawal, Water yield, Groundwater recharge, Water level fluctuations, Hydrogeology, Petrology, Municipal water, Domestic water, Irrigation water.
Identifiers: *Fresno area(Calif).

The Fresno area of California uses about 140,000 acre-feet of ground water a year for municipal and domestic purposes. An average of 2,000,000 acre-feet of water a year is pumped for irrigation. Major sources of recharge are deep penetration of irrigation water (80 percent) and seepage from canals, rivers, and streams (15 percent). Ground water occurs under unconfined and confined conditions; most water is pumped from the unconfined, alluvial aquifer. Ground-water quality is generally suitable for domestic and irrigation uses, although hardness and concentrations of nitrates and dissolved solids are of local concern. Water levels in the unconfined aquifer declined about 25 feet in the period 1947-1976. Levels in the confined aquifer declined about 100 feet in the period 1954-1976. Increased reliance on ground water for irrigation during the drought period will accelerate water-level declines. (Woodard-USGS)
W78-00190

GROUND-WATER LEVELS IN THE UNITED STATES, 1972-74. NORTH-CENTRAL STATES.
Geological SSurvey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00191

GROUND-WATER LEVELS IN THE UNITED STATES, 1971-74. SOUTHWESTERN STATES.
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00192

SUMMARY GROUND-WATER RESOURCES OF LUZERNE COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, PA. Water Resources Div.
T. G. Newport.
Pennsylvania Geological Survey, Harrisburg, Fourth Series, Water Resources Report 40, 1977. 63 p, 10 fig, 1 plate, 5 tab, 21 ref.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Well data, *Water quality, Water yield, Groundwater movement, Petrology, Hydrogeology, Surface-groundwater relationships, Groundwater recharge, Water supply, Pennsylvania.
Identifiers: Luzerne County(Pa).

The geologic units in Luzerne County, Pa., include the unconsolidated Quaternary deposits; the Pennsylvania Llewellyn and Pottsville Formations; the Mississippian Mauch Chunk and Pocono Formations; and the Devonian Catskill Formation, marine beds, and Hamilton Group. Ground water occurs largely in the pore spaces, secondary openings, and solution channels in the consolidated rocks. In the alluvium deposits along the Susquehanna River, yields of over 1,000 gpm have been reported from wells. The Llewellyn Formation, marine beds, and Hamilton Group are the poorest of the bedrock aquifers. Well yields range from less than 1 to 50 gpm and water is of poor quality. In the other bedrock aquifers, well yields range from 2 to 325 gpm, and most wells produce soft water of good quality. Well-water samples collected outside of the mined areas were of acceptable quality. Ground water in the vicinity of the coal mines is generaly high in iron and sulfate. There is no known overdraft of ground water anywhere in the county, except in the vicinity of active mines, where the water table is being lowered to facilitate mining. The locations of sources of pollution, such as sanitary landfills and septic tanks, are a major factor in the selection of well sites. The discharge from abandoned strip and deep mines is a major source of pollution. (Woodard-USGS)
W78-00193

EFFECTS OF DRAIN WELLS ON THE GROUND-WATER QUALITY OF THE WESTERN SNAKE PLAIN AQUIFER, IDAHO,
Geological Survey, Boise, ID. Water Resources Div.
For primary bibliographic entry see Field 5B.
W78-00197

MUNICIPAL WATER SUPPLIES IN LEE COUNTY, FLORIDA, 1974,
Geological Survey, Tallahassee, FL. Water Resources Div.
T. H. O'Donnell.
Open-file report 77-277, May 1977. 96 p, 30 fig, 23 tab, 17 ref.

Descriptors: *Municipal water, *Water supply, *Water utilization, *Water demand, *Withdrawal, Surface waters, Groundwater, Water quality, Aquifers, Drawdown, Evaluation, Hydrologic data, *Florida.
Identifiers: Lee County(Fla).

In 1974 the total pumpage for Lee County, Fla., municipal supplies reached 5,700 Mgal (million gallons annually), an increase of 54 percent over 1970 levels. Pumpage from individual sources included: Caloosahatchee River, 1,312 Mgal; water-table aquifer, 2,171 Mgal; the water-bearing zone in the Tamiami Formation, 340 Mgal; the water-bearing zone in the upper part of the Hawthorn Formation, 1,399 Mgal; the saline water zones in the lower part of the Hawthorn Formation and the Suwannee Limestone, 483 Mgal. Among the various sources, the water-table aquifer showed the greatest increase in municipal pumpage over 1970 levels (60 percent) while the saline zones in the lower part of the Hawthorn Formation and Suwannee Limestone showed the least (40 percent). Intensive pumpage from the water bearing zone in the upper part of the Hawthorn Formation has caused a progressive decline in water levels in wells tapping that zone. The quality of fresh ground water in areas unaffected by intrusion of saline water, generally meets all the recommended limits of the Environmental Protection Agency. The chemical treatment processes utilized by water plants in the county are generally effective in producing finished water that meets EPA preliminary drinking water standards. (Woodard-USGS)
W78-00198

WATER RESOURCES DATA FOR GEORGIA, WATER YEAR 1976.
Geological Survey, Doraville, GA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00200

WATER RESOURCES DATA FOR NEW YORK, WATER YEAR 1976--VOLUME 1. NEW YORK EXCLUDING LONG ISLAND.
Geological Survey, Albany, NY. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00202

WATER RESOURCES DATA FOR NEBRASKA, WATER YEAR 1976.
Geological Survey, Lincoln, NE. Water Resources Div.

For primary bibliographic entry see Field 7C.
W78-00203

NATURE AND EXTENT OF GROUND-WATER-QUALITY CHANGES RESULTING FROM SOLID-WASTE DISPOSAL, MARION COUNTY, INDIANA,
Geological Survey, Indianapolis, IN. Water Resources Div.
For primary bibliographic entry see Field 5B.
W78-00205

EVALUATION OF GROUND-WATER QUALITY IN THE SANTA MARIA VALLEY, CALIFORNIA,
Geological Survey, Menlo Park, CA. Water Resources Div.
For primary bibliographic entry see Field 5B.
W78-00206

WATER RESOURCES DATA FOR NEW YORK, WATER YEAR 1976--VOLUME 2. LONG ISLAND.
Geological Survey, Albany, NY. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00210

FEASIBILITY STUDY FOR IRRIGATING THE TRIBAL FARM ON THE CROW CREEK RESERVATION, FORT THOMPSON, SOUTH DAKOTA,
Roubal (Dana Larson) and Associates, Pierre, SD.
For primary bibliographic entry see Field 3F.
W78-00216

GROUNDWATER IN THE SOUTHERN PART OF THE CESKOTREBOVSKA VRCHOVINA (HIGHLAND),
Ceskoslovenska Akaedmie Ved, Brno. Geograficky Ustav.
For primary bibliographic entry see Field 2F.
W78-00374

ACCELERATED SALT TRANSPORT METHOD FOR MANAGING GROUND WATER QUALITY,
California Univ., Davis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W78-00442

A HIERARCHY OF RESPONSE FUNCTIONS FOR GROUNDWATER MANAGEMENT,
Mekoroth Water Co., Tel-Aviv (Israel). Systems Engineering Dept.
Y. C. Dreizin, and Y. Y. Haimes.
Water Resources Research, Vol. 13, No. 1, p 78-86, February 1977. 5 fig, 4 tab, 20 ref. OWRT B-062-OHIO(3).

Descriptors: *Groundwater, *Management, *River basins, *Aquifers, *Linear programming, Pumping, Recharge, Streams, Stress, Ohio, Input-output analysis, Simulation analysis, Methodology, Behavior, Hydraulics, Mathematical models, Equations, Systems analysis.
Identifiers: Response functions, Decomposition approach, Superposition approach, Boundary conditions.

The physical system dealt with in this paper is a river basin with multiunit aquifers and interconnected streams. The problem is how to model this complex system and then to represent it in terms of its response to stress in the form of pumpage and recharge. The system responds to pumpage in two ways: as drawdown or as flow between streams and aquifers. A hierarchy of linear mathematical models for a large-scale physical system response to stress has been developed. For the system response, an explicit mathematical expression is used to couple the physical system with the formulation of a management model. The models developed herein have been successfully tested on a case study of the Fairfield-New Baltimore area at the lower part of the Great Miami River in southwestern Ohio. (Bell-Cornell)
W78-00444

SHAPES OF STEADY STATE PERCHED GROUNDWATER MOUNDS,
Iowa State Univ., Ames. Dept. of Agronomy.
For primary bibliographic entry see Field 2F.
W78-00446

4C. Effects On Water Of Man's Non-Water Activities

EFFECTS OF THE URBAN ENVIRONMENT ON HEAVY RAINFALL DISTRIBUTION,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 2B.
W78-00091

HIGHWAY ICE AND SNOW REMOVAL AND DEICING SALT PROBLEMS AT LAKE TAHOE,
California State Dept. of Transportation, Sacramento.
For primary bibliographic entry see Field 5B.
W78-00261

PHYSICAL OCEANOGRAPHY OF DEEP-WATER DUMPSITE 106 FEBRUARY-MARCH, 1976,
National Marine Fisheries Service, Narragansett, RI. Atlantic Environmental Group.
For primary bibliographic entry see Field 1A.
W78-00315

LONG-TERM EFFECTS OF REPEATED LOGGING ON AN APPALACHIAN STREAM,
Northeastern Forest Experiment Station, Parson, WV.
J. H. Patric, and G. M. Aubertin.
Journal of Forestry, Vol 75, No 8, p 492-494, August, 1977. 1 fig, 9 ref, 3 tab.

Descriptors: *Water quality, *Forest watersheds, *West Virginia, *Lumbering, Forest management, Surface waters, Streamflow, Streams, Turbidity, Roads, Appalachian Mountain Region, Forestry.

A watershed on the Fernow Experimental Forest (West Virginia) has been logged four times since the turn of the century. While little is known of how streams were affected by logging after 1901 or during World War II, the effect of diameter-limit cutting in 1958 and 1972 are well documented. Both cuts caused small increases in streamflow but had little effect on water quality by any criterion except turbidity, which was increased by poorly located and ill-managed logging roads. The evidence suggests that if responsible road practices are followed, continued diameter-limit cutting will not harm forest streams. (Witt-IPC)
W78-00376

SURVIVAL OF THREE GRASS SPECIES AFTER INUNDATION,
Rocky Mountain Forest and Range Experiment Station, Alburquerque, NM.
For primary bibliographic entry see Field 2I.
W78-00384

MAN'S IMPACT ON ESTUARINE SEDIMENTATION,
State Univ. of New York at Stony Brook.
For primary bibliographic entry see Field 5G.
W78-00392

IMPLICATION OF RESOURCE DEVELOPMENT ON THE NORTH SLOPE OF ALASKA WITH REGARD TO WATER QUALITY ON THE SAGAVANIRKTOK RIVER,
Corvallis Environmental Research Lab., College, AK. Arctic Environmental Research Station.
For primary bibliographic entry see Field 5B.
W78-00420

4D. Watershed Protection

NOAA-ARS COOPERATIVE SNOW RESEARCH PROJECT - WATERSHED HYDRO-CLIMATOLOGY AND DATA FOR WATER YEARS 1960-1974,
National Weather Service, Silver Spring, MD. Office of Hydrology.
For primary bibliographic entry see Field 2C.
W78-00068

THE INFLUENCE OF HUMAN ACTIVITY ON THE EXPORT OF PHOSPHORUS AND NITRATE FROM FALL CREEK,
Cornell Univ. Agricultural Experiment Station, Ithaca, NY. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W78-00131

SEDIMENT-TRAP EFFICIENCY OF TORTUGAS ARROYO NEAR LAS CRUCES, NEW MEXICO, WATER YEARS 1963-1974,
Geological Survey, Albuquerque, NM. Water Resources Div.
D. E. Funderburg, and F. E. Roybal.

Descriptors: *Sediment control, *Reservoir silting, *Trap efficiency, *New Mexico, Dry beds, Thunderstorms, Runoff, Streamflow, Flow rates, Sediment yield, Particle size, Reservoir operation.
Identifiers: *Tortugas Arroyo(N Mex), Las Cruces(N Mex).

The U.S. Geological Survey, in cooperation with the U.S. Soil Conservation Service, began an investigation of sedimentation of Tortugas Floodwater Retarding Reservoir No. 1 on Tortugas Arroyo near Las Cruces, New Mexico, in 1963. This investigation was part of a nationwide investigation of the trap efficiency of detention reservoirs. Reservoir No. 1 is normally a dry reservoir and runoff from the 20.7 sq mi drainage area generally occurs from high-intensity summer thundershowers. The total outflow recorded for the period of record (July 3, 1963 to June 30, 1974) was 1,743 acre-feet, yielding 6,055 tons of sediment. Over 99 percent of the coarse sediments and a high percentage of the silts and clays were deposited in the reservoir before reaching the outflow pipe. The determined trap efficiency of Reservoir No. 1 was 96 percent for the period of record. (Woodard-USGS)
W78-00199

FLUVIAL SEDIMENT DATA FOR IOWA: SUSPENDED-SEDIMENT CONCENTRATIONS, LOADS AND SIZES: BED-MATERIAL SIZES: AND RESERVOIR SILTATION,
Geological Survey, Cheyenne, WY. Water Resources Div.; and Geological Survey, Iowa City, IA.
For primary bibliographic entry see Field 7C.
W78-00201

HYDROLOGY OF THE CREEPING SWAMP WATERSHED, NORTH CAROLINA, WITH REFERENCE TO POTENTIAL EFFECTS OF STREAM CHANNELIZATION,
Geological Survey, Raleigh, NC. Water Resources Div.
For primary bibliographic entry see Field 4A.
W78-00207

HYDROLOGIC DATA FOR URBAN STUDIES IN THE FORT WORTH, TEXAS METROPOLITAN AREA, 1975,
Geological Survey, Austin, TX. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00209

PROCEEDINGS: LAKE TAHOE RESEARCH SEMINAR III.
Lake Tahoe Area Research Coordination Board, South Lake Tahoe, CA.
For primary bibliographic entry see Field 5G.
W78-00260

EROSION AND SEDIMENT CONTROL TECHNOLOGY,
California State Water Resources Control Board, Sacramento.
For primary bibliographic entry see Field 5G.
W78-00263

REVEGETATION AND EROSION CONTROL AT HEAVENLY VALLEY,
For primary bibliographic entry see Field 5G.
W78-00264

AREAWIDE WASTE TREATMENT AND EROSION CONTROL PLANNING,
For primary bibliographic entry see Field 5G.
W78-00265

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

PLANNING CHEMICAL MONITORING PROGRAMS FOR INDUSTRIAL FACILITIES AND ELECTRIC POWER PLANTS,
Westinghouse Electric Corp., Pittsburgh, PA. Environmental Systems Dept.
H. K. Roffman.
In: Institute of Environmental Sciences 1977 Proceedings, April 25-27, 1977, Los Angeles, California, p 32-35, 4 tab.

Descriptors: *Monitoring, *Analytical techniques, *Environmental effects, *Sampling, *On-site data collections, Bioassay, Water pollution effects, Geochemistry, Air pollution, Industrial wastes, Chemical wastes, Trace elements, Waste water disposal.
Identifiers: Chemical monitoring programs.

A checklist of facts to be considered in the design and implementation of a chemical monitoring program for industrial installation, power plants, and mining operations is provided. The selection of program parameters, specific sampling techniques, sample preservation and preparation methods, and appropriate analytical methods is suggested before a chemical monitoring program is initiated. Major functions of a chemical monitoring program are outlined, including preparation of baseline studies, detection of impact trends, detection of pollution abatement equipment malfunction, identification of periods of major impact, and the collection of data for general use. Specific objectives to be met are described for each function of a chemical monitoring program. Sampling techniques for air, water, solids, and aquatic and terrestrial flora and fauna are described. Methods of sample preservation and preparation which insure sample integrity are described. (Schulz-FIRL)
W78-00015

EFFECTIVE MEASUREMENT OF CHLORINE RESIDUAL,
J. J. Morrow, and J. B. Martin.
Effluent and Water Treatment Journal, Vol. 17, No. 5, p 238-242, May, 1977. 3 fig, 1 tab, 9 ref.

Descriptors: *Chlorination, *Disinfection, *Automatic control, *Analytical techniques, *Monitoring, Colorimetry, Equipment, Industrial wastes, Municipal wastes, Water treatment, *Waste water treatment.
Identifiers: *Chlorine residuals.

Objectives and methods of chlorination and techniques for measuring chlorine residuals are reviewed. Various terms related to chlorination are defined, including: dosage, demand, residual, free chlorine residual, combined chlorine residual, total chlorine residual, available C12, and breakpoint chlorination. Measurement techniques described for chlorine residuals include the idometric, orthotolidine (OT), orthotolidine-arsenite (OTA), amperometric, diethyl-p-phenylene (DPD), leuco crystal violet (LCV), and stabilized neutral orthotolidine (SNORT) methods. Typical dosages, residual types, and residual levels are given for a variety of municipal and industrial situations in which chlorination is indicated, including disinfection of raw water, control of organic growths, control of bacteria, and chemical removal/oxidation. The choice of chlorine gas dispensation and chlorine residual control are described. (Schulz-FIRL)
W78-00017

COOLING-WATER CALCULATIONS,
Air Products and Chemicals, Inc., Allentown, PA.
For primary bibliographic entry see Field 5B.
W78-00064

DETERMINATION OF TRACE QUANTITIES OF ORGANIC SUBSTANCES FROM INDUSTRIAL WASTES IN WASTE WATERS (OPREDELENIE SLEDOV ORGANICHESKIKH VESHCHESTV-PROMYSHLENNYKH OTKHODOV V STOCHNYKH VODAKH),
V. Kubelka, J. Mitera, J. Novak, and J. Mostecky.
Technologie Vody, Vol F, No 20, p 85-119, 1976. 14 fig, 2 tab, 57 ref.

Descriptors: *Analytical techniques, *Water analysis, *Organic wastes, *Gas chromatography, *Mass spectrometry, Chemical analysis, Path of pollutants, Organic compounds, Volatility, Chemical wastes, Industrial wastes, Waste water disposal, *Pollutant identification.

Analytical methods involving gas chromatography in combination with mass spectrometry for the identification of trace quantities of organic compounds in water are reviewed. The applicability of a particular technique is suggested as dependent on the structural and physico-chemical properties of the substance. Two basic techniques for identifying water-borne pollutants having a wide range of boiling points are described. In the first process a stream of inert gas is used to strip volatile compounds from the water. The compounds are then trapped in a freezing loop at the temperature of liquid nitrogen. The mixture is transferred from the trap to the gas chromatograph-mass spectrometer by rapid heating of the loop to 200C. The detection for this method with substances having a boiling point greater than 140C is approximately 0.1 ppb. For the second process, organic pollutants in water are sorbed on a styrene-divinylbenzene copolymer and washed with a solvent. Tests with waters containing xylene, cresol, and quinoline indicated that extended sorption periods and/or increases in the accumulated amount of sorbent produced analytical errors. Although the reliability of the method is also dependent on the mutual action of contaminants during sorption, the method is suggested as accurate for measuring concentrations in units as low as ppb for low volatile compounds. (Schulz-FIRL)
W78-00065

PASSIVE REMOTE SENSING OF PHYTOPLANKTON VIA CHLOROPHYLL ALPHA FLORESCENCE,
Department of the Environment, Victoria (British Columbia). Inst. of Ocean Sciences.
For primary bibliographic entry see Field 7B.
W78-00090

PESTICIDE POLLUTION STUDIES.
Public Health Service, Atlanta, GA. Div. of Water Supply and Pollution Control.
For primary bibliographic entry see Field 5B.
W78-00098

CHARACTERISTICS OF WASTE WATERS FROM PACKINGHOUSES,
Marquette Univ., Milwaukee, WI.
For primary bibliographic entry see Field 5B.
W78-00100

WASTEWATERS DISCHARGED FROM AN ABATTOIR,
Water Pollution Research Lab., Stevenage (England).
For primary bibliographic entry see Field 5B.
W78-00108

WASTES FROM POULTRY DRESSING ESTABLISHMENTS,
Public Health Service, Kansas City, MO.
For primary bibliographic entry see Field 5B.
W78-00112

TWO INDUSTRIAL WASTE PROBLEMS AT NEW HAVEN, CONN.,
Hartford Sewage Treatment Plant, CT.
K. E. Foote.
Sewage and Industrial Wastes, Vol. 24, No. 10, p. 1305, Oct 1952.

Descriptors: *Clogging, *Food processing industry, *Oil pollution, *Waste identification, Industrial wastes, Sewage treatment, Treatment facilities, Waste water treatment, Sewage, Connecticut, Pollutant identification.
Identifiers: *Meat packing wastes, *Pork processing, Grease pollution, Hartford(Conn).

A pork slaughtering and processig plant located on the shore of a harbor was connected with the municipal sewers. The waste from this plant is grease, hog hairs or bristles, hog worms, and hog toenails. Grease is the main problem in the treatment plant and specific plant locations and problems involving combinations with hair wastes are discussed. The processing plant has installed a pumping station, settling and skinning tanks, fine bar screens and mesh screens on the floor drains. (Prodehl - EPA, Corvallis)
W78-00114

POULTRY DRESSING WASTE,
Indiana State Board of Health Indianapolis.
For primary bibliographic entry see Field 5D.
W78-00115

PRODUCTION AND TRANSPORT OF GASEOUS NH3 AND H2S ASSOCIATED WITH LIVESTOCK PRODUCTION,
Oregon State Univ., Corvallis. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5G.
W78-00120

INPUTS OF CHLORINATED BENZENES,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5B.
W78-00137

TECHNIQUES FOR COLLECTING DDT AND PCB IN AERIAL FALLOUT,
Southern California Coastal Water Research Project, El Segundo.
T. C. Heesen, and R. A. Johnson.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 39-41, 1977. 2 tab.

Descriptors: *Water pollution sources, *DDT, *Pesticides, *Analytical techniques, *Fallout, Air pollution, California Continental shelf, Resources development, Environmental effects, Polychlorinated biphenyls.
Identifiers: *Outer Continental Shelf, Resources management, Southern California, Vapor phase.

An air sampler to measure the partitioning of chlorinated hydrocarbons between the particulate and vapor phases was developed. In recent surveys a dry-ice-cooled collector was employed. There was good agreement between the total DDT and 1254 PCB values obtained with the dry-ice sampler and those obtained with the regular sampler, the oiled plate. Thus, the measurements obtained in past fallout surveys appear to be reliable and revolatilization of these components from the glass plate collectors does not appear to be occurring to any significant degree. At all stations measured, the ratio of volatile to particulate components is higher for p,p'-DDE and p,p'-DDT. This is to be expected since p,p'-DDE is more volatile than p,p'DDT. The ratios also indicate that most of the chlorinated hydrocarbons measured are in the vapor phase as they are trapped on the foam sample. (See also W78-00134) (Sinha-OEIS)
W78-00138

AERIAL FALLOUT OF METALS DURING A BRUSHFIRE,
Southern California Coastal Water Research Project, El Segundo.
D. R. Young, and T-K. Jan.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 43-47, 1977. 2 fig, 2 tab, 2 ref.

Descriptors: *Water pollution sources, *Heavy metals, *Chlorinated hydrocarbon pesticides, *Fallout, California, Continental Shelf, Resources development, Environmental effects.
Identifiers: *Outer Continental Shelf, Southern California, Resources management.

The data indicate that aerial fallout probably is a relatively minor source of most metals to the coastal waters off highly populated sections of southern California. With the exception of lead, which is used in antiknock additives in gasoline and primarily enters the atmosphere via automobile emissions, aerial inputs of the toxic metals are one to two orders of magnitude below those from municipal wastewater. The importance of the aerial fallout of these contaminants would not be much altered if major forest fires burned under desert wind conditions the year around. Thus, fires do not appear to be significant sources of trace metals or chlorinated hydrocarbons to the coastal marine ecosystem. (See also W78-00134) (Sinha-OEIS)
W78-00139

MEASUREMENTS OF SUBTHERMOCLINE CURRENTS,
Southern California Coastal Water Research Project, El Segundo.
T. Hendricks.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 63-70, 1977. 3 fig, 1 tab.

Descriptors: *Water pollution sources, *Currents(Water), *Measurement, *Pollutant identification, Dispersion, Variability, California, Continental shelf, Resources development, Environmental effects.
Identifiers: *Outer continental shelf, *Southern California, Subthermocline currents, Alongshore flow, Resources management.

Measurements made at a number of sites over the nearshore shelf area off southern California show similarities in the currents: The mean of the speeds at all sites at a depth of 41 m in 56 m of water was 9.8 cm/sec; the mean speed for each site differed from the area-wide value by less than 20%. The predominant direction of flow is alongshore--approximately parallel to the local contours of constant depth. The similarity in statistical properties supports on of the assumptions in the dispersion model and indicates that a single calculation may be applicable to a number of areas. Some differences between sites were, however, also evident: Although the mean speed for a particular site did not greatly differ from the area-side average, there appeared to be definite differences among sites. Tidal currents varied significantly from site to site, not only in the speed and predominant direction of flow, but also in the ranking of importance of the various tidal harmonics. (See also W78-00134) (Sinha - OEIS)
W78-00142

MERCURY IN SEDIMENTS,
Southern California Coastal Water Research Project, El Segundo.
R. P. Eganhouse Jr.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 83-89, 1977. 3 fig, 2 tab, 2 ref.

Descriptors: *Water pollution sources, *Mercury, *Sediments, *Outfall sewers, *Pollutant identification, California, Continental shelf, Resources development, Environmental effects.
Identifiers: *Outer continental shelf, Southern California, Palos Verdes shelf.

Because of high levels of heavy metals found in sediments near Los Angeles County Sanitation Districts outfall system off Whites Point in 1970, detailed survey of the Palos Verdes shelf were conducted in 1972 and 1973. The results of the 1975 survey for total mercury in surface sediments in this same area are given. Results show that levels of total mercury in the surface sediments on the Palos Verdes shelf dropped slightly between 1972 and 1975, although the exact cause of this decrease is still uncertain. Organic mercury constituting up to 2.3% of the total mercury, appears to have been concentrated in the regions where total mercury values were highest, except for two stations near the outfalls, where organic values dropped. Data on the relationship between total volatile solids and total mercury showed that mercury in the surface sediments is probably trapped in the refractory component and is largely unavailable to the benthic animals. (See also W78-00134) (Sinha - OEIS)
W78-00145

VIRUSES AND BACTERIA IN COASTAL WATERS AND SHELLFISH,
Southern California Coastal Water Research Project, El Segundo.
R. L. Morris, A. J. Mearns, and J. Kim.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 97-103, 1977. 4 tab, 3 ref.

Descriptors: *Water pollution sources, *Viruses, *Bacteria, *Shellfish, *Municipal wastes, *Pollutant identification, Outfall sewers, Coliforms, Mussels, California, Continental shelf, Environmental effects.
Identifiers: *Outer continental shelf, Southern California, Resources management.

The objectives of research this year were to (1) determine the concentrations and rates at which enteric viruses enter the sea via municipal wastewater effluents, (2) measure concentrations of viruses in the digestive glands of mussels suspended from buoys near outfalls, and (3) determine the relationship between virus and coliform concentrations in mussels and seawater. The most important finding to date is that viruses can be detected in shellfish near outfalls and do appear to survive relatively longer in mussels than do total coliforms. The relative time required for 90% of the viruses in seawater to be inactivated was estimated to be three to six times as long as that for total coliform. (See also W78-00134) (Sinha - OEIS)
W78-00147

MERCURY IN MUSSELS,
Southern California Coastal Water Research Project, El Segundo.
R. P. Eganhouse Jr., and D. R. Young.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 105-109, 1977. 3 fig, 2 tab, 1 ref.

Descriptors: *Mercury, *Mussels, *Bioindicators, *Water pollution, *Pollutant identification, *Heavy metals, California, Continental shelf, Environmental effects, Water pollution sources.
Identifiers: *Outer continental shelf, Southern California Bight, Mytilus californianus.

Experiments demonstrate the value of Mytilus californianus as an environmental bioindicator. Studies showed that, of the three tissues analyzed, digestive gland contained the highest levels of mercury and experiences the fastest uptake. Adductor muscle and gonadal tissues had markedly slower accumulation rates. These results tend to support the idea that the digestive gland analyses reflect environmental mercury levels, but the adductor muscle and gonadal tissues are more accurate indicators of the extent of physiological incorporation. The digestive gland mercury concentrations appear to reflect relatively short-term changes in the environment. The gradual accumulation of mercury in adductor muscle and gonadal tissues, however, appears to result primarily from a chronic exposure to mercury. (See also W78-00134) (Sinha - OEIS)
W78-00148

MERCURY IN BENTHIC ANIMALS,
Southern California Coastal Water Research Project, El Segundo.
R. P. Eganhouse Jr., and D. R. Young.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 111-115, 1977. 3 fig, 2 tab, 1 ref.

Descriptors: *Mercury, *Benthos, *Growth, *Water pollution sources, *Sediments, Outfall sewers, California, Continental shelf, Environmental effects.
Identifiers: *Outer continental shelf, Southern California, Microstomus pacificus, Organomercurials.

The object of this study was to determine if uptake of mercury had occurred in benthic animals from the Palos Verdes region. The survey involved collection of six different species totaling 96 specimens from trawl stations. In general, the levels of total mercury appeared to be low and did not reflect the high concentrations found in Palos Verdes sediments. Good correlations were found between concentrations to total and organic mercury in various tissues of Dover sole, Microstomus pacificus. The data showed a significant, although somewhat scattered, relationship between both total and organic mercury and the common measures of growth. An analysis of the data with respect to the proximity to the outfall failed to reveal any distinct distribution patterns. This implies that the tissue mercury content of these benthic animals is not governed significantly by the levels of mercury in the sediments. The data lead one to believe that the mercury contained in the Palos Verdes sediments is largely unavailable

to benthic animals that are found there. (See also W78-00134) (Sinha - OEIS)
W78-00149

METALS IN SCALLOPS,
Southern California Coastal Water Research Project, El Segundo.
D. R. Young, and T-K. Jan.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 117-121, 1977. 2 tab, 4 ref.

Descriptors: *Water pollution sources, *Metals, *Shellfish, *Municipal wastes, Outfall sewers, California, Continental Shelf, Environmental effects.
Identifiers: *Outer Continental Shelf, Southern California, Hinites multirugosus.

Los Angeles County's submarine discharge of municipal wastewater off the Palos Verdes Peninsula is the single largest man-related source of trace metals to the marine ecosystem off southern California. Bottom sediments around this submarine outfall system are highly contaminated by a number of trace metals. Abnormal levels of seven metals are found in three tissues of filter-feeding rock scallops (Hinites multirugosus) that were collected in the discharge zone and thus had been exposed to suspended wastewater particulates. Although the results of this study point to a potential problem from waste materials discharged via municipal outfalls, it is not known yet the degree to which these elevated metals levels affect the rock scallop or its predators (including man). Standards for these metals in seafood have not yet been established. Toxicity information that relates abnormal tissue concentrations with adverse biological effects is needed and results from field studies, such as this one, is a necessary first step in conducting relevant toxicity tests. (See also W78-00134) (Sinha - OEIS)
W78-00150

CHEMICAL STUDIES OF OFFSHORE OIL PLATFORMS,
Southern California Coastal Water Research Project, El Segundo.
D. McDermott-Ehrlish, and G. A. Alexander.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 129-135, 1977. 1 fig, 5 tab, 2 ref.

Descriptors: *Oil pollution, Offshore platforms, *Sediments, *Metals, Vanadium, Water pollution sources, Environmental effects, Continental shelf, California, Resources development.
Identifiers: *Outer continental shelf, Southern California, Resources management, Sebastes auriculatus, Sebastes vexillaris, Cancer anthonyi.

As part of the effort to determine if drilling and oil production operations had an effect on organisms found around two oil platforms, chemical analyses of the nearby sediments and of the tissues of several marine animals found in the area were made. Levels of copper, zinc, hexane extractable materials, and volatile solids in sediments around the oil platforms were similar to average coastal background levels and were well below levels observed in sediments contaminated by municipal wastewater outfalls. The petroleum hydrocarbon content of all sediment samples collected was higher than values observed in areas with no natural seeps. The gas chromatographic fingerprints for all samples were indicative of highly weathered oil, indicating no recent contamination of the sediments. No statistically significant differences in metals were observed for yellow rock crabs collected from the oil platforms and control sites and no detectable amount of petroleum hydrocarbons were observed in any of the animals analyzed. (See also W78-00134) (Singa - OEIS)
W78-00152

COMPARISON OF FIN EROSION DISEASE: LOS ANGELES AND SEATTLE,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5C.
W78-00154

RAPID ANALYSIS OF PACKINGHOUSE WASTES,
Morrell (John) and Co., Ottumwa, IA. Research Labs.
K. A. Hirlinger, and C. E. Gross.
Sewage and Industrial Wastes, Vol 25, No 8, p 958-962, August, 1953. 1 fig, 6 tab, 7 ref.

Descriptors: *Water analysis, *Oil wastes, *Food processing industry, Analysis, Industrial wastes, *Waste identification, *Pollutant identification, Oxygen demand.
Identifiers: *Meat packing wastes, Oxygen demand analysis, Grease analysis.

Data sufficiently reliable for good plant control and for estimating the probable effect of discharged wastes on the receiving stream can be obtained the same day the sample is taken. Satisfactory results can be had on a routine basis using the rapid methods described. Data from the Kjeldahl nitrogen analysis and the Smith-Sanderson grease analysis will give a reliable check on nitrogen and grease losses from the plant. The same data can be used to calculate oxygen demand. Use of these data (which can easily be confirmed by the reflux chromate oxygen consumed analysis) will give the basis for a constant estimate of the probable effect of sewage on the oxygen resources of the receiving stream. All of this information will be available rapidly enough to permit immediate corrective action whenever trouble develops. (Prodehl-EPA, Corvallis)
W78-00168

STATISTICAL EVALUATION OF PACKINGHOUSE WASTE DATA,
Environmental Health Center, Oak Ridge, TN.
C. A. Straub.
In: Proceedings of the 8th Industrial Waste Conference, Purdue University, Lafayette, Indiana, Engr. Ext. Ser. No. 83, p 222-239, May 1953. 16 fig, 22 ref.

Descriptors: *Statistics, *Food processing industry, Biochemical oxygen demand, Data collections, Industrial wastes, Oil wastes, Waste identification, Waste water treatment.
Identifiers: *Meat packing wastes, Statistical evaluation.

In an attempt to group published data from many plants on characteristics of packinghouse and slaughterhouse wastes, and to obtain a more reliable estimate of the normal range in values that might be expected in volume, biochemical oxygen demand, suspended solids, total nitrogen, grease and population equivalent of the wastes, these data are analyzed by statistical methods. By means of standard graphical and analytical statistical procedures used, mean values for many of the packing waste parameters and variation in the data are presented. In general, log probability plots of these data are normal. The analytical procedures employed bring out the fact that packinghouse and slaughterhouse data may be highly variable, resulting from the variability in plant killing and recovery practices, numbers and kinds of animals slaughtered, and waste collection or treatment facilities available, etc. (Prodehl-EPA, Corvallis)
W78-00169

POULTRY PROCESSOR MEETS CHALLENGE OF INCREASED WASTE LOAD,
Gold Kist, Inc., Atlanta, GA.
W. J. Camp.
Industrial Wastes, September 1969, p 24-26. Presented at the 18th Southern Water Resources and Pollution Control Conference, North Carolina, April 9, 1969.

Descriptors: *Food processing industry, *Waste identification, *Waste water treatment, Activated sludge, Aerobic treatment, Design data, Flow rates, Industrial wastes, Standards, *Biochemical oxygen demand.
Identifiers: *Poultry processing wastes, Extend aeration, In-plant waste control, By-product recovery.

Gold Kist Poultry presently operates six poultry plants in four states with a combined hourly capacity of 67,000 birds and processes approximately 2.5 million birds/week. Waste loading per 1000 birds in 1965 was 63.3 lb BOD, 47 lb SS, and 7570 lb BOD/day. The Florida State Board of Health set the effluent standards for one plant at BOD less than 10 mg/l, no settleable solids, no grease, MPN not to exceed 500, and residual chlorine should be not less than 0.5 mg/l after 30 minutes detention. In-plant waste control and by-product recovery such as 64% protein feed from offal and feathers, were designed extensively in the plant. The waste treatment plant consists of a large extended aeration system based on influent design data of 50,000 birds per day, 10 gal. water per bird, and 52 lb. BOD per 1000 birds. Each unit process is discussed. The plant is operating with the following results: 7.6 gal/water bird, 39 lb BOD/1000 birds, and final effluent at 99 - 100% BOD removal per day. (Prodehl - EPA, Corvallis)
W78-00180

ANAEROBIC DIGESTION OF PACKING PLANT WASTES,
Hormel (George A.) and Co., Austin, MN.
For primary bibliographic entry see Field 5D.
W78-00181

STERLING POULTRY PIONEERS PLANT WATER RECLAMATION,
Sterling Poultry Processing Corp., Oakland, MD.
For primary bibliographic entry see Field 5D.
W78-00183

ESTIMATING BIOAVAILABILITY OF SEDIMENT-BOUND TRACE METALS WITH CHEMICAL EXTRACTANTS,
Geological Surve, Menlo Park, CA. Water Resources Div.
S. N. Luoma, and E. A. Jenne.
In: Trace Substances in Environmental Health-X: Symposium held at University of Missouri, Columbia, Missouri, June 8-10, 1976, p 343-351, 1976. 3 tab, 12 ref.

Descriptors: *Heavy metals, *Sediments, Estuarine environment, *Clams, *Food chains, Laboratory tests, Cadmium, Cobalt, Zinc, *Trace elements, Pollutant identification.
Identifiers: *Macoma balthica, *Silver, *Trace metals.

Chemical extraction from laboratory prepared sediments of the biologically available fraction of Ag, Cd, Co and Zn is best accomplished by complexation and/or mild dissolution procedures. Deposit-feeding clams (Macoma balthica) were exposed in separate experiments to radio-tracers of the 4 elements bound to 6 physicochemically types of sediment (organic detritus, iron oxides, organically coated iron oxides, manganese oxides, inorganic carbonates and biogenic carbonates). At the end of each experiment, tracer concentrations in clam soft tissues were compared with the concentration of tracer chemically extracted from experimental sediments by several geochemical techniques. Because Ag was highly available from all types of sediment, uptake by the clam correlated well with most indicators of non-crystalline Ag concentrations. However, uptake of Cd, Co and Zn was strongly influenced by physicochemical form. Concentrations of Cd or Co accumulated

by the clam from the different sediments correlated significantly only with the concentration of the metal extracted by 70% ethanol or 1 N ammonium acetate. Bioaccumulation of Zn was most closely estimated by 1 N ammonium acetate extraction of 1 N NaOH plus EDTA extraction of the different sediments. Concentrations of Cd, Co and Zn extracted by weak acids (0.1 N HCl: 25% acetic acid), reducing agents (1 N hydroxylamine hydrochloride in 0.01 N HNO3; sodium dithionite plus citrate) or oxidizing agents (3% H2O2 plus citrate) correlated poorly with bioaccumulation. (Woodard-USGS)
W78-00196

MUNICIPAL WATER SUPPLIES IN LEE COUNTY, FLORIDA, 1974,
Geological Survey, Tallahassee, FL. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-00198

WATER RESOURCES DATA FOR GEORGIA, WATER YEAR 1976.
Geological Survey, Doraville, GA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00200

WATER RESOURCES DATA FOR NEW YORK, WATER YEAR 1976--VOLUME 1. NEW YORK EXCLUDING LONG ISLAND.
Geological Survey, Albany, NY. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00202

WATER RESOURCES DATA FOR NEBRASKA, WATER YEAR 1976.
Geological Survey, Lincoln, NE. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00203

WATER RESOURCES DATA FOR NEW YORK, WATER YEAR 1976--VOLUME 2. LONG ISLAND.
Geological Survey, Albany, NY. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00210

NATIONAL WATER QUALITY INVENTORY. 1974 REPORT TO THE CONGRESS. VOLUME I.
Environmental Protection Agency, Washington, DC. Office of Water Planning and Standards.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 627, Price codes: A14 in paper copy, A01 in microfiche. Report EPA-440/9-74-001, 1974, 305 p. EPA/440/9-74/001.

Descriptors: *Rivers, *Water quality, *Baseline studies, Water quality control, Water pollution, Watersheds(Basins), Mississippi River, Missouri River, Ohio River, Tennessee River, Columbia River, Hudson River, Delaware River, Potomac River, Rio Grande River, Colorado River, Sacramento River, Lake Michigan, Phosphorus, Oxygen demand, Nitrogen, Eutrophication, Bacteria, Nutrients, Algae, Tributaries.
Identifiers: Snake River, Willamette River, Detroit area(Mich), Susquehanna River, Alabama River, Coosa River, Arkansas River, Red River, Brazos River, Yukon River, Boston harbor(Mass), Chicago area(Ill), Los Angeles Harbor(Cal).

This first systematic inquiry of water quality in U.S. waterways was prepared by the Environmental Protection Agency pursuant to the 1972 Federal Water Pollution Control Act. It is organized into three sections: water quality status, point source inventory, and water quality goals. The first section concentrates on the largest rivers, and waters near the largest cities. Tables and figures are presented showing degree of pollution, water temperature, stream flow, turbidity, color, dissolved oxygen, biochemical oxygen demand, pH, alkalinity, filtrable and nonfiltrable residue, organic nitrogen, ammonia, nitrite plus nitrate, phosphate, hardness, and coliforms. Rivers covered statistically only are: Hudson, Delaware, Susquehanna, Potomac, Alabama-Coosa, Arkansas, Red, Brazos, Rio Grande, Colorado, Sacramento, Yudon, Boston harbor, Chicago metropolitan, Detroit metropolitan, and Los Angeles harbor. Eight rivers are covered in greater detail: Mississippi, Missouri, Ohio, Tennessee, Detroit area, Columbia, Snake, and Willamette. The second section gives summary statistical information on point sources of pollution, including permit applications, municipal discharges by state, and industrial discharges by industry. Section Three describes planning goals and gives brief, descriptive assessments of water quality problems by state. The report's general conclusion is that pollutants receiving the most widespread controls (such as oxygen-demanding loads and bacteria) are improving, but eutrophication-associated nutrients (nitrogen and phosphorus) are worsening. (Lynch-Wisconsin)
W78-00214

SUITABILITY OF SHELLFISH FOR PROCESSING: 2. SEASONAL CHANGES IN HEAVY METAL CONTENT OF BABY CLAM, (IN KOREAN)
Pusan Fisheries Coll. (Republic of Korea). Dept. of Food Science and Technology.
E.-H. Lee, B-H. Ryu, and S.-T. Yang.
Bull Korean Fish Soc 8(2), p 85-89, 1975.

Descriptors: Shellfish, Seasonal, *Heavy metals, *Clams, *Pollutant identification, Mercury, Lead, Copper, Cadmium, Water quality standards.
Identifiers: Korea, Tapes-japonica.

Heavy metal contents were determined in baby clams (Tapes japonica) from March 1973-April 1974 in Depori, Samchunpo, Korea. Monthly changes of Hg, Pb, Cu and Cd in the samples were irregular but as a whole, the content of Hg, Pb, Cu and Cd were relatively high in the summer. The content of total Hg, Pb, Cu and Cd in the samples ranged from 0.003-0.038 ppm, 0.096-0.921 ppm, 0.023-0.139 ppm and 0.009-0.038 ppm, respectively. In the consideration of heavy metal content, it was concluded that baby clams in Depori, Samchunpo, Korea are suitable for processing.--Copyright 1976, Biological Abstracts, Inc.
W78-00225

IMPACT OF ACID PRECIPITATION ON FRESHWATER ECOSYSTEMS IN NORWAY,
Norsk Inst. for Vannforskning, Blindern.
For primary bibliographic entry see Field 5C.
W78-00226

A COMPARATIVE SURVEY OF PETROLEUM HYDROCARBONS IN LAKE SEDIMENTS,
Washington Univ., Seattle. Dept. of Chemistry; and Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W78-00233

POTAMOLOGICAL STUDIES ON THE RIVER INA OF THE RIVER SYSTEM OF YODO: II, (IN JAPANESE),
Osaka Kyoiku Univ. (Japan). Oceanography Lab.
For primary bibliographic entry see Field 5B.
W78-00234

COMPARATIVE E ALUATION OF WATER QUALITY ON THE ST. JOSEPH RIVER (MICHIGAN AND INDIANA, U.S.A.) BY THREE METHODS OF ALGAL ANALYSIS,
California Academy of Sciences, San Francisco. Dept. of Zoology.
S. L. Vanlankingham.
Hydrobiologia, Vol. 48, No. 2, p. 145-173, 1976. 12 fig, 6 tab, 28 ref.

Descriptors: *Water quality, *Analytical techniques, Evaluation, Chemical analysis, Standing crops, Seasonal, Coliforms, Algae, Nutrients, *Michigan, *Indiana, Rivers, *Pollutant identification.
Identifiers: *St. Joseph River(Mich - Indiana), *Palmer's Index, Microalgal spectral analysis.

A study was made to determine the water quality of the St. Joseph River in Michigan and Indiana and to designate particular problem sites. In addition specific information was sought on the effects of seasonal changes upon the algal flora and water quality of the river. Samples from 28 stations along the river were chemically, physically and biologically analyzed. The latter analysis employed three methods: (1) standing crop (in units per ml); (2) Palmer's index (PI); and (3) microalgal spectral analysis (MSA) which utilized saprobien and dissolved inorganic nutrients with additional physical, chemical and ecological spectra. The results showed no evidence of water quality improvement at the mouth of St. Joseph River since the 1968 Water Resources Commission report. Both nutrient and saprobien spectra of MSA showed that water quality was poorer at station 29 (near the river mouth) in December 1972 than at any other station where microalgal analysis was performed. This stands in contrast with a low Palmer's Index for this station. However when PI is considered in conjection with coliform and fecal coliform bacteria and such parameters as SOP, TP, NH3, DO, BOD, SS and NO3, degradation in water quality is much more evident. This implies that neither the standing crop nor the generic PI may be reliable measures of nutrients in colder, less productive times of the year and that MSA correlates better with the various physical and chemical parameters and therefore is a more reliable method of evaluating dissolved organic nutrients. (Harris-Wisconsin)
W78-00236

A QUANTITATIVE SAMPLING METHOD FOR HYDRILLA-INHABITING MACROINVERTEBRATES,
Florida Univ., Gainesville. School of Forest Resources and Conservation.
For primary bibliographic entry see Field 5G.
W78-00245

A BIOASSAY USING COMMON DUCKWEED TO EVALUATE THE RELEASE OF AVAILABLE PHOSPHORUS FROM POND SEDIMENTS,
New Jersey Dept. of Transportation, Trenton. Bureau of Environmental Analysis.
A. Fekete, D. N. Riemer, and H. L. Motto.
Journal of Aquatic Plant Management, Vol. 14, June 1976, p 19-25. 11 fig, 4 tab, 14 ref.

Descriptors: *Chemical analysis, *Bioassay, *Phosphorus, *Sediments, Nutrients, Ponds, Growth rates, Aquatic plants, Plant growth, Eutrophication, Nutrient requirements, Essential nutrients, Aerobic conditions, Anaerobic conditions.
Identifiers: *Duckweed, Lemna minor.

Common duckweed (Lemna minor) was used to determine the availability of phosphorus in pond sediments under aerobic and anaerobic conditions. Preliminary tests showed the minimum critical value of P concentration in the plant tissue associated with maximum growth to be .15-.22%. A P concentration of 0.031 mg perliter in a test nutrient solution was the critical concentration above

which growth was most pronounced. Three bottom sediment samples from man-made impoundments at Rutgers University's research center in Adelphia, N.J. were selected to represent low, medium, and high levels of absorbed P. Nutrient solutions were added to the sediments, which were then incubated. Jars containing nutrient solution but no sediment were designated blanks. In the sediment tests under both aerobic and anaerobic conditions greatest frond number and size, root length, dry weight, and P content of the plants were directly related to higher P concentrations in the sediments. The magnitude of the results of the anaerobic tests was much greater than the aerobic, however, implying that a greater release of available P occurred under anaerobic conditions. Chemical analysis of the total P released from the sediments demonstrated that this method was not useful in predicting the amount of P available to the duckweed, and showed the superiority of the bioassay. (Lynch-Wisconsin)
W78-00246

WASTE WATER SAMPLING SYSTEM,
J. A. Perry.
U.S. Patent No. 4,024,766, 9 p, 12 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 958, No 4, p 1437, May 24, 1977.

Descriptors: *Patents, *Waste water treatment, *Industrial wastes, *Water pollution control, *Sampling, Water sampling, Monitoring, Control systems, Measurement, Equipment, Pollutant identification.

The object of this invention is to provide an improved waste water sampling system for industrial plants which takes precise and representative samples from the effluent. In a force main sampling chamber the liquid is always maintained above a predetermined level so as to insure that a sample can always be drawn. An improved seal leg construction tends to cause the waste water flowing past it to be maintained in a state which is representative of all of the waste water flowing through the system. A flow loop has a meter so oriented that it gives an extremely accurate measurement of the amount of flow passing through the system. The waste water monitoring system has an improved control circuit which will terminate operation of the sampling cycle in the event that a sample is not taken within a predetermined time period after the sampling cycle has been initated, to thereby permit additional sampling cycles to be initiated. (Sinha - OEIS)
W78-00301

RECENT ANALYSES OF COPPER, CADMIUM AND LEAD AT DEEPWATER DUMPSITE 106,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
D. R. Kester, K. A. Hausknecht, and R. C. Hittinger.
In: NOAA Dumpsite Evaluation Report 77-1, Baseline Report of Environmental Conditions in Deepwater Dumpsite 106, Vol 3, Contaminent Inputs and Chemical Characteristics - Appendix, p 543-546, June 1977. 1 tab, 1 ref. NOAA-04-6-148-44050.

Descriptors: *Waste disposal, Water pollution, *Heavy metals, *Baseline studies, *Environmental effects, Copper, Cadmium, Lead, *Pollutant identification.
Identifiers: *Outer continental shelf, *Ocean dumping.

During 1976 additional research was carried out on the concentrations of some of the transition and heavy metals at DWD-106. Analyses of copper, cadmium, and lead were obtained from a series of samples collected aboard R/V KNORR cruise 58, on 27 August - 7 September 1976 using 8 liter Niskin samplers. A table lists the concentrations of metals from three stations in the DWD-106 region which represent 'background' values. These stations were not in the immediate influence of a test dump of waste. The cadmium concentrations are an order of magnitude less than those reported in the May 1974 and February 1976 studies. The lead values are a factor of 20 less than the earlier studies and the copper concentrations approximately one-half the values reported in the earlier work. With refinements in the techniques for collecting, processing, and analyzing seawater samples for transition and heavy metals, it has been possible to show that the background concentrations at DWD-106 are similar to those observed in other oceanic regions. (Sinha - OEIS)
W78-00329

ATMOSPHERIC VANADIUM TRANSPORT TO THE OCEAN,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 5B.
W78-00336

TOXICITY OF PULP AND PAPER MILL EFFLUENTS,
British Columbia Research Council, Vancouver.
For primary bibliographic entry see Field 5C.
W78-00369

DETERMINATION OF FREE SULFUR DIOXIDE IN SPENT SULFITE LIQUOR AND PAPER MILL EFFLUENTS USING A SELECTIVE ELECTRODE (DETERMINAZIONE DI ANIDRIDE SOLFOROSA LIBERA NEL LISCIVO SOLFITICO ESAUSTO ED IN ACQUE DI SCARICO DE CARTIERA MEDIANTE ELETTRODO SELETTIVO),
Istituto di Fisica dell'Atmosfera, Bologna (Italy).
S. Fuzzi.
Industria della Carta, Vol 15, No 3, p 69-72, March, 1977. 3 fig, 6 ref, 2 tab.

Descriptors: *Pulp wastes, *Water analysis, *Electrodes, *Sulfite liquors, Wastes, Industrial wastes, Water pollution sources, Sulfur compounds, Effluents, Pulp and paper industry, Potentiometers, Effluents, *Pollutant identification.
Identifiers: *Sulfur dioxide, Spent sulfite liquor.

The potentiometric measurement of free sulfur dioxide in spent sulfite liquor and paper mill effluents by means of a sulfur dioxide-selective electrode was studied. The data obtained from such potentiometric measurements and from iodometric titrations (corrected for interfering substances) were compared, showing the two techniques to give results which are in good agreement within the limits of experimental error. Potentiometric measurement of free sulfur dioxide in spent sulfite liquor must be performed after dilution of the sample in order for the electrode measuring range to be appropriate. The dilution of spent sulfite liquor converts some loosely bound sulfur dioxide to free sulfur dioxide, leading to high results. (Speckhard-IPC)
W78-00373

CHARACTERIZING EFFLUENT VARIABILITY FROM PAPER INDUSTRY WASTEWATER TREATMENT PROCESSES EMPLOYING BIOLOGICAL OXIDATION,
Tufts Univ., Medford, MA.
For primary bibliographic entry see Field 5B.
W78-00378

LABORATORY DETERMINATION OF ACUTE AND SUBLETHAL TOXICITIES OF INORGANIC CHLORAMINES TO EARLY LIFE STAGES OF COHO SALMON (ONCORHYNCHUS KISUTCH),
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 5C.
W78-00400

WATER QUALITY CRITERIA RESEARCH OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY, PROCEEDINGS OF AN EPA SPONSORED SYMPOSIUM ON MARINE, ESTUARINE AND FRESHWATER QUALITY, PRESENTED AT THE 26TH ANNUAL MEETING OF THE AIBS, AUGUST 1975.
Corvallis Environmental Research Lab., OR.
For primary bibliographic entry see Field 5B.
W78-00408

TRACE METALS IN THE OCEANS: PROBLEM OR NO,
Environmental Research Lab., Narragansett, RI.
For primary bibliographic entry see Field 5B.
W78-00410

CRITERIA FOR MARINE MICROBIOTA,
Environmental Research Lab., Narragansett, RI.
For primary bibliographic entry see Field 5B.
W78-00412

MONITORING THE ENVIRONMENT FOR ECOLOGICAL CHANGE,
Washington Univ., Seattle. Dept. of Biostatistics.
For primary bibliographic entry see Field 5B.
W78-00422

AQUATIC INSECTS AS BIOLOGICAL MONITORS OF HEAVY METAL POLLUTION,
Iranian Dept. of the Environment, Tehran.
For primary bibliographic entry see Field 5B.
W78-00426

CONTINUOUS FLOW CULTURE OF BENTHIC DIATOMS AND ITS APPLICATION TO BIOASSAY,
Michigan Univ., Ann Arbor. Great Lakes Research Div.
C. K. Lin.
Journal of Phycology, Vol. 13, p 267-271, 1977. 3 fig, 2 tab, 22 ref.

Descriptors: *Bioassay, *Diatoms, *Productivity, *Cultures, *Continuous flow, Research and development, Toxicity, Copper, Filters, Growth stages, Algae, Plankton, Benthic flora, Design, Methodology, Membranes, Pollutant identification.
Identifiers: Artificial substrate, Colonization, Agar substrate, Diatom, Ecology.

Diatom colonization showed large variation and low reproducibility on Millipore membranes of different materials and pore sizes. Solidified agar substrate supported stable and reproducible colonization and was nutritionally neutral, translucent, homogeneous and easy to sample. The diatom colonization process on agar substrate involved four growth phases: (1) pioneer, (2) exponential, (3) steady state, and (4) vanishing. The culture system was also used in bioassay, testing the toxic effect of copper on the growth of benthic diatoms. The proposed method provided a useful means for studying autecology of benthic diatoms as well as for bioassay work. (Klein)
W78-00427

WARNING TEST TO DETECT THE PRESENCE OF HIGHLY TOXIC CONCENTRATIONS OF POISONS IN WATER,
Landestelle fuer Gewaesserkunde und Wasserwirtschaftliche Planung, Baden-Wuerttemberg (West Germany).
W. K. Besch, H. G. Loseries, K. Meyer-Waarden, and W. Schmitz.
November 1975, 20 p. Translation from Archiv fur Hydrobiologie, Vol. 71, No. 4, p 551-565, 1974. 3 fig, 10 ref.

Descriptors: *Toxicity, Design, Research and development, *Warning systems, Hazard, Regula-

tion, Water pollution, Water quality, Fish behavior, Effluents, Methodology, Public health, *Monitoring, *Pollutant identification, Bioassay, Bioindicators.
Identifiers: *Rheomenotaxis, Toxicant, Rheotaxis.

A warning test system was designed to detect the immediate presence of highly toxic concentrations of poisonous substances in drinking water supplies, waste treatment plant effluents and bank filtrate. Rheomenotaxis was used as test criterion. The alarm threshold was defined as a certain arbitrary reduction in the fish's ability to swim against the current. Test apparatus, operation of the warming system, design, care of test fish, and testing results were presented. (Klein)
W78-00428

METALS IN PLANTS AND WATERS IN THE OKEFENOKEE SWAMP AND THEIR RELATIONSHIP TO CONSTITUENTS FOUND IN COAL,
Governors State Univ., Park Forest South, IL. Coll. of Environmental and Applied Sciences.
For primary bibliographic entry see Field 5B.
W78-00429

POTENTIAL CONTRIBUTION OF ATMOSPHERIC FALLOUT TO THE PHOSPHORUS BUDGET OF COLUMBIA LAKE, CONNECTICUT,
Connecticut Univ., Storrs. Biological Sciences Group.
For primary bibliographic entry see Field 5B.
W78-00438

A STUDY OF THE WASTE WASH WATER FROM EGG WASHING MACHINES,
Richard B. Russell Agricultural Research Center, Athens, GA.
D. Hamm, G. K. Searcy, and A. J. Mercuri.
Poultry Science, Vol 53, p. 191 - 197, 1974. 3 fig, 2 tab, 4 ref.

Descriptors: *Chemical oxygen demand, *Flow rates, *Waste identification, *Water analysis, *Water sampling, Food processing industry, Poultry, Suspended solids, Pollutant identification.
Identifiers: *Poultry processing wastes, Egg washing, Total solids, Volatile solids.

The egg washer waste waters from 11 grading and breaking plants in the Southeast were sampled and characterized for the common pollution parameters. Egg grading plants studies were found to use an average of 4.6 liters of water per case for washing. Measured median waste concentrations for the wash waters were: for the grading plants - Chemical Oxygen Demand (COD) 7,300 mg/l, total solids 9,300 mg/l, volatile solids 4,600 mg/l; for the breaking plant washers COD 22,500, total solids 27,000, and volatile solids 16,600 mg/l. (EPA, Corvallis)
W78-00458

PACKINGHOUSE WASTE TRICKLING FILTER EFFICIENCY FOLLOWING AIR FLOTATION,
Morrell (John) and Co., Ottumwa, IA. Chemical and Research Labs.
For primary bibliographic entry see Field 5D.
W78-00463

5B. Sources Of Pollution

AMINO ACID COMPOSITION OF DRIED CITRUS SLUDGE AND ITS POTENTIAL AS A POULTRY FEEDSTUFF,
Agricultural Research Service, Winter Haven, FL. Citrus and Subtropical Products Lab.
R. L. Coleman, and P. E. Shaw.
Journal of Agricultural and Food Chemistry, Vol. 25, No. 4, p 971-973, 1977. 1 tab, 11 ref.

Descriptors: *Poultry, *Citrus fruits, *Industrial wastes, *Feeds, *Ultimate disposal, Sludge disposal, Anaerobic digestion, Food processing industry, *Amino acids, Aerobic treatment, Sludge treatment, Waste water treatment.

The protein contents and amino acid profiles for three types of citrus sludges were measured and compared with the amino acid profiles and nutritional requirements for poultry feed. Samples of aerobic, anaerobic, and sun-dried sludge were collected from waste treatment facilities of commerical citrus processors. Amino acid and protein composition of dried citrus sludges are compared in tabular form with amino acid requirements of broiler pullets. Variations in composition were found in sludges obtained from different sources. Amino acid contents were similar in amount for the aerobic and anaerobic digested sludges. The lower amino acid content in sun-dried sludges was attributed to the lack of protein production during digestion. Comparisons between pullet requirements and sludge composition indicated that the use of citrus sludge for poultry feed requires the addition of arginine, histidine, and methionine to maintain desired growth rates. (Schulz-FIRL)
W78-00018

COOLING-WATER CALCULATIONS,
Air Products and Chemicals, Inc., Allentown, PA.
R. G. Kunz, A. F. Yen, and T. C. Hess.
Chemical Engineering Vol 84, No 16, p 61-71, August 1, 1977. 7 fig, 9 tab, 27 ref.

Descriptors: *Mathematical models, *Heat exchangers, *Water analysis, *Cooling water, *Industrial water, Recirculated water, Hydrogen ion concentration, Chemical properties, Alkalinity, Dilution, Conductivity, Pollutant identification, Scaling, Hardness(Water).
Identifiers: Cooling-tower water, Makeup water.

Mathematical equations are presented for the calculation of evaporation, makeup, and blowdown in an open recirculating cooling system. The average composition of cooling-tower makeup water is presented. Alkalinity, pH, and hardness are defined as the most important parameters which contribute to impurities in cooling-tower water. Methods for measuring and controlling electroneutrality are described. Procedures for predicting the pH of recirculating water on the basis of cycles of concentration are described. A formula for predicting the amount of sulfuric acid necessary to adjust the pH to a given level is presented. Predicted values for conductivities of makeup waters are compared with observed values. The Langelier and Ryznar indices for representing the tendency for a system to deposit scale are defined. Dissolved materials such as phosphates, calcium, silica, iron, copper, and aluminum, which may precipitate on heat transfer surfaces in a cooling tower, are discussed. An example problem in which evaporation, makeup, blowdown, electroneutrality, pH, total dissolved solids, and conductivity are calculated for five cycles is presented. (Schulz-FIRL)
W78-00064

DETERMINATION OF TRACE QUANTITIES OF ORGANIC SUBSTANCES FROM INDUSTRIAL WASTES IN WASTE WATERS (OPREDELENIE SLEDOV ORGANICHESKIKH VESHCHESTV-PROMYSHLENNYKH OTKHODOV V STOCHNYKH VODAKH),
For primary bibliographic entry see Field 5A.
W78-00065

VARIATION OF NITRATE VS. PHOSPHATE RATIO IN THE PACIFIC WATER,
Meteorological Coll., Kashiwa (Japan).
T. Sagi.
Papers in Meteorology and Geophysics, Vol 28, No 1, p 9-27, March 1977. 4 fig, 12 tab, 16 ref, 1 append.

Descriptors: *Nitrates, *Phosphates, *Pacific Ocean, Sea water, On-site data collections, Sampling, Nutrients, Chemicals, Water chemistry, Oceans, Regression analysis, Data processing, Oceanography.
Identifiers: *Nitrate-phosphate ratios.

A linear relationship was confirmed, not only between phosphate and AOU, but also between nitrate and AOU. From these results, phosphate and nitrate may be said to consist, respectively, of 2 parts; i.e., the AOU dependent one, which is oxidative, and the AOU non-dependent one, which is conservative. A linear relation also was confirmed between conservative nitrate and conservative phosphate in the Pacific waters. Observational results showed that the relation between conservative nitrate and conservative phosphate can be formulated simply as a linear equation. However, in some cases, some deviations were found from the equation. (Sims-ISWS)
W78-00070

LONGITUDINAL DISPERSION WITH DEAD ZONES,
Canterbury Univ., Christchurch (New Zealand). Dept. of Civil Engineering.
E. M. Valentine, and I. R. Wood.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 103, No HY9, Proceedings Paper 13028, p 975-990, September 1977. 10 fig, 9 tab, 3 append.

Descriptors: *Dispersion, *Streamflow, *Path of pollutants, *Model studies, Mathematical models, Solutes, Pollution, Water pollution, Flow, Eddies, Movement, Mixing, Diffusivity, Streams, Rivers, Hydrology, Turbulence.
Identifiers: Longitudinal dispersion, Dead zones.

The dispersion process for an instantaneous line source of solute in a two-dimensional turbulent shear flow with dead zones was formulated to 2 differential equations, one for the solute in the flow zones, and the other for the solute trapped in the dead zones on the bed. Exchange of material occurs between dead zones and flow. Using the Aris moment transformation, the equations were converted to a more tractable system of equations which were solved by numerical methods with the aid of a digital computer for zeroth, first, second, and third moments of the longitudinal concentration distribution. Various forms of dead zone volume were imposed, and its effects on the dispersion process were demonstrated. It was shown for the numerical model employed that dead zones not only increase the rate of dispersion but also delay the occurrence of Fickian type dispersion. (Sims-ISWS
W78-00075

DEVELOPMENT AND RESORPTION OF A THERMAL DISTURBANCE IN A PHREATIC AQUIFER WITH NATURAL CONVECTION,
Neuchatel Univ. (Switzerland). Centre de Hydrogeologie.
B. Mathey.
Journal of Hydrology, Vol. 34, No. 3/4, p 315-333, August 1977. 9 fig, 4 tab, 9 ref.

Descriptors: *Aquifers, *Thermal water, *Injection wells, Storage, Underground storage, Water temperature, Groundwater, Wells, Water wells, On-site investigations, Model studies, Mathematical models, Heat, Heated water, Heat flow, Convection, Heat balance, Groundwater movement, Piezometers.
Identifiers: *Colombier-Robinson Aquifer(Switzerland), *Heat storage, Heat dispersion.

Development and resorption of a thermal disturbance with natural convection in a phreatic aquifer during a 5-month injection-pumping cycle were studied. Evaluation of thermal balance revealed insignificant losses but an important 'dilution' of the disturbance by thermal conduction. (Sims-ISWS)
W78-00083

NEW ENGLAND OFFSHORE MINING ENVIRONMENTAL STUDY: THE CHARACTER OF PARTICLE DISPERSION AND WATER MOVEMENT IN MASSACHUSETTS BAY AND ADJACENT WATERS,
National Oceanic and Atmospheric Administration, Miami, FL. Atlantic Oceanographic and Meteorological.
T. A. Nelsen, D. A. Mayer, P. G. Hatcher, and W. N. Hess.
Estuarine and Coastal Marine Science, Vol. 5, No. 4, p 455-465, July 1977. 9 fig, 10 ref.

Descriptors: *Bays, *Water circulation, *Massachusetts, *Coasts, On-site investigations, Currents(Water), Measurements, Tracers, Current meters, Instrumentation, Dredging, Dispersion, Salinity, Estuaries, Tidal effects, Tracking techniques, On-site data collections, Water temperature, Profiles.
Identifiers: *Cape Cod Bay(Mass), Dredge spoil, Drogues.

The New England Offshore Mining Environmental Study (NOMES) was conducted in Massachusetts Bay during June 1973. The project was designed to study the dispersal of fine particles during proposed sand and gravel dredging operations. Current meter and drogue measurements revealed a strong north-south current shear zone. The mean motion within 10 km of the beach was predominately northward, while seaward of this limit the mean flow was mostly southward. Silt-size glass spheres and synthetic sphalerite (ZnS) particles were used as tracers to determine the behavior of suspended particles. The sphalerite data showed particle dispersion toward Boston Harbor, eastward toward Stellwagen Bank and the Atlantic, and southward hugging the Massachusetts shore, and following a counter-clockwise gyre in Cape Cod Bay. (Humphreys-ISWS)
W78-00086

PESTICIDE POLLUTION STUDIES.
Public Health Service, Atlanta, GA. Div. of Water Supply and Pollution Control.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-245 756, Price codes: A03 in paper copy, A01 in microfiche. Progress Report, March 1963. 30 p, 8 fig, 2 tab.

Descriptors: *Water pollution, *Pesticides, *Projects, Surveys, Insecticides, Water pollution sources, Sampling, Chemical analysis, Analytical techniques, Water quality, Fish, Biology, Agriculture, Hydrology, Pollutants.

The Pesticide Pollution Project of the Division of Water Supply and Pollution Control, Public Health Service, U.S. Department of Health, Education, and Welfare began in 1959 as a result of multiple stimuli which focused attention on the vital need for information concerning the impact of pesticides on water quality. These stimuli include reports of pesticide-caused fish kills, the recovery of DDT from surface waters in various parts of the country, and public reaction to the fire ant eradication activities of the U.S. Department of Agriculture. In addition, scientists concerned with the occurrence of carbon chloroform extractables in water have long pointed to the need for more precise and definitive characterization of these materials. In general, the pesticides are a part of this group of organic materials. The administration and field activities of this Project are directed from the Atlanta Regional Office of the Department of Health, Education, and Welfare. Until July 31, 1962, analytical services were performed under contract by Clemson College, Clemson, South Carolina. Since that date, these activities have been carried out in the Project's own laboratory in Atlanta. This report of the Pesticide Pollution Studies covered the period from inception of the project in 1959 to February 1963. This was an informational report only, not to be considered part of the scientific literature, but rather a progress report to keep interested persons informed. Major findings were set forth without presentation of complete data. Some conclusions were tentative and subject to change, and many of the detailed analyses were not complete. (Sims-ISWS)
W78-00098

CHARACTERISTICS OF WASTE WATERS FROM PACKINGHOUSES,
Marquette Univ., Milwaukee, WI.
A. E. Zanioni, and R. J. Kipp.
Industrial Water Engineering, p. 18-21, August/September 1977.

Descriptors: *Flow rates, *Food processing industry, *Oil wastes, *Water analysis, Biochemical oxygen demand, Industrial wastes, Standards, Sewage, Wisconsin, Treatment facilities.
Identifiers: *Meat packing wastes, Grease, Waste loads.

A discussion is given initially on objectives and methods of an industrial wastewater survey. Some important advantages of using manual sampling of flows are listed, virtually all data presented were derived from samples obtained manually and analyses performed according to procedures in 'Standard Methods.' A detailed schematic and discussion of wastewater sources in a typical packinghouse operation are presented. The killing operation, the cleaning of casings and the paunch manure removal operation cause 70 to 90 percent of the total pollution load discharged. Twenty-four hour waste water surveys were conducted at five different packing houses in the State of Wisconsin over the last few years. Tabulated along with discussions of each table are the results of the survey including: (1) comparison of the wastewater characteristics, (2) screenings retained on 20 mesh, (3) fluctuations in wastewater loadings, (4) comparison of average peak loadings, and (5) comparison of losses; data given in terms of BOD, SS, TKN, and grease. (Prodehl - EPA, Corvallis)
W78-00100

WASTEWATERS DISCHARGED FROM AN ABATTOIR,
Water Pollution Research Lab., Stevenage (England).
H. E. Jones.
The Surveyor, Vol 107, p. 159-160, March 26, 1948. 1 tab, 3 ref.

Descriptors: *Food processing industry, *Livestock wastes, *Waste identification, *Water analysis, Industrial wastes, Water pollution sources, Biochemical oxygen demand, Ammonia, Suspended solids, Ohio, *Pollutant identification.
Identifiers: *Meat packing wastes, *Slaughterhouses, Waste loads.

The tendency to centralize the meat industry accentuates the problem of slaughterhouse waste disposal, especially in rural areas. From the material published in the United States on slaughterhouse and packinghouse wastes it appears that the amount of polluting matter discharged for a given number of animals is greater at small plants where recovery is less efficient. An investigation of pollution of the Ohio River found that the combined wastes from slaughterhouses had an oxygen demand of approximately 1,000 ppm and a population equivalent of about 18 per hog unit killed per day. At plants where meat products were prepared and packed the population equivalent was about 24 per hog unit killed per day. A tabulation of results from an investigation of a cattle, sheep, and pig slaughterhouse and processing plant is presented showing flow, SS, BOD, ammonia, and equivalent volume of domestic sewage for different sections of the plant. (Prodehl - EPA, Corvallis)
W78-00108

DESIGN OF A GREASE RECOVERY PLANT FOR A MEAT PACKER,
Arizona Univ., Tucson.
For primary bibliographic entry see Field 5D.
W78-00109

THE CHARACTERISTICS OF WASTES FROM CHICKEN PACKING PLANTS,
Rutgers - The State Univ., New Brunswick, NJ.
H. Heukelekian, H. E. Orford, and J. L. Cherry.
Sewage and Industrial Wastes, Vol. 22, No. 4, p. 520-521, April 1950, 5 tab.

Descriptors: *Waste identification, *Waste water treatment, *Food processing industry, Biochemical oxygen demand, Suspended solids, Treatment facilities, Flow rates, Industrial wastes, Sedimentation, Water analysis, Delaware.
Identifiers: *Poultry processing wastes, Waste loads.

A survey of the pollution problems arising from chicken packing plants was made on a cooperative basis with the Delaware State Department of Health. This investigation entailed studies of the plant processes, the strengths and flows of the various wastes, the effect of different types of treatment, and the effectiveness of existing waste treatment facilities. Four packing plants were involved and tabulated data are shown for volumes of flow, BOD, and suspended solids for existing plant processes and for alternate methods of treatment. Some conclusions were: (1) wastes emitted at different times vary in strength. (2) Major portions of BOD and SS are derived from battery washings (manure). (3) Removal of SS from mixed wastes by sedimentation was 85 percent. The BOD removal was 25 to 35 percent. (4) Scraping the batteries reduced the waste load and volume of sludge. (5) The sludge rapidly becomes putrescible. (6) Alum treatment resulted in substantial removal of SS. (7) Sand filtration of the settled mixed wastes resulted in rapid clogging and impaired the efficiency of BOD reduction. (8) Digestion of the sludge is feasible. (Prodehl - EPA, Corvallis)
W78-00111

WASTES FROM POULTRY DRESSING ESTABLISHMENTS,
Public Health Service, Kansas City, MO.
R. Porges.
Sewage and Industrial Wastes, Vol. 22, p. 521-535, April, 1950. 4 tab, 6 ref.

Descriptors: *Water analysis, *Waste identification, *Poultry, Biochemical oxygen demand, Flow measurement, Food processing industry, Laboratory tests.
Identifiers: *Poultry processing wastes, Waste loads, Waste sources.

During an investigation of water pollution in the Kansas River Basin numerous poultry dressing establishments were appraised to determine the amount of pollution produced. The usual procedure was to establish a flow gauging station, installing a weir whenever possible, and check waste discharges against water meter readings. Sampling was taken at 15 minute intervals by assigned survey personnel. Laboratory analyses, which were performed according to 'Standard Methods', consisted of the following determinations: (1) pH, (2) BOD standard 5-day, 20C, (3) suspended solids (total, fixed and volatile), (4) turbidity, (5) chlorides, (6) alkalinity. Volume and

laboratory analyses of combined wastes are shown in tabular form, including population equivalents. Sources of, quantity, and character of wastes are discussed for each major plant process. Poultry dressing wastes are similar to those encountered at slaughterhouses and meat packing plants. Oxygen depletion, sludge deposition, and coloration are the principal effects of these wastes on receiving waters. (Prodehl - EPA, Corvallis)
W78-00112

FATE OF ANIMAL VIRUSES IN EFFLUENT FROM LIQUID FARM WASTES,
Guelph Univ. (Ontario). Dept. of Veterinary Microbiology and Immunology.
J. B. Derbyshire.
Journal of Milk and Food Technology, Vol. 39, No. 3, p. 214-217, March, 1976. 5 tab, 8 ref.

Descriptors: *Effluents, *Viruses, Soil contamination, Groundwater, *Agricultural runoff, Water pollution, Public health, Aeration, *Farm wastes, Liquid wastes, Waste water disposal.
Identifiers: *Swine wastes, *Dairy wastes.

Various aspects of viral pollution of the environment associated with disposal of liquid farm manure of agricultural land are being investigated. Techniques have been developed for concentration and recovery of animal viruses from various field samples. Seventeen of 22 samples of liquid manure from a swine fattening house yielded enteroviruses, adenoviruses, and a coronavirus. One enterovirus was isolated from six samples of waste from a swine farrowing house, but no virus was isolated from 18 samples of liquid cattle manure obtained from a dairy farm. A swine enterovirus was isolated from surface soil samples collected up to 8 days after liquid manure was spread on agricultural land. A swine enterovirus was also isolated from 2 of 26 samples of surface runoff collected from sites at which liquid pig manure was routinely spread on agricultural land. Thirty-three samples of surface water and 36 samples of ground water were collected in areas in which liquid pig manure was routinely spread on farm land, and a swine enterovirus was isolated from one surface water sample. Field and laboratory experiments indicated that enteroviruses are more rapidly inactivated in aerated liquid manure than in untreated manure. (Merryman-East Central)
W78-00116

WASTE DISPOSAL IN BEEF FEEDLOTS,
New Zealand Agricultural Engineering Inst., Lincoln.
For primary bibliographic entry see Field 5G.
W78-00117

SOLUBLE CATIONS BENEATH A FEEDLOT AND AN ADJACENT CROPPED FIELD,
Agricultural Research Service, Lincoln, NE.
L. F. Elliott, T. A. Travis, and T. M. McCalla.
Soil Science Society of America Proceedings, Vol. 40, No. 4, p 513-516, July-Aug., 1976. 2 tab, 8 ref.

Descriptors: *Feed lots, *Cations, Sampling, Soils, Groundwater, Soil water movement, Sodium, Potassium, Calcium, Magnesium, Zinc, Copper, Iron, Manganese, Water pollution sources, *Path of pollutants, Solubility, Farm wastes.

The purpose was to determine potential or possible movement of cations to groundwater by measuring cations in the soil solution beneath a feedlot and an adjacent cropped field. Soil solution samples were studied for a 12 month period. Concentrations of sodium, potassium, calcium, magnesium, zinc, copper, iron, and manganese were determined. Only calcium, magnesium, and manganese were higher in the feedlot soil solution than in the cropped field at the lower depths tested. At these depths, calcium and magnesium were 2 to 4 times higher in soil solution from the feedlot than from the cropped field. While manganese was consistently higher beneath the feedlot than the field, manganese levels were low. Although some dissolved cations were slightly above EPA recommended values, only slight dilution by the aquifer would be required. If the feedlot is kept stocked and the manure interface is kept intact, pollution of the aquifer by any of the cations tested is unlikely. (Rowe-East Central)
W78-00121

POLLUTION POTENTIAL OF MANURE SPREAD ON FROZEN GROUND,
Agricultural Research Service, Morris, MN.
R. A. Young, and C. K. Mutchler.
Journal of Environmental Quality, Vol. 5, No. 2, p 174-179, 1976. 2 fig, 7 tab, 7 ref.

Descriptors: *Water pollution, *Agricultural runoff, Erosion, Nutrients, *Farm wastes, Rates of application, Waste disposal.
Identifiers: Land application, *Frozen ground, Snowmelt runoff.

Studies were begun at Morris, Minnesota in 1971 to determine the contribution of manure application on frozen ground to the nutrient content of snowmelt runoff. Eight experimental plots, 4.06 m wide by 23.35 m long, with a 9% average slope, were set up on land furnished by the University of Minnesota's West Central Experiment Station. Two plots were planted in newly seeded alfalfa with an oat cover crop. Two plots were left in 6-year-old alfalfa. Manure treatments on the 4 corn plots consisted of 44.8 metric tons/ha solid dairy manure, wet basis, (1) applied in fall and plowed under, (2) applied in fall on frozen ground, (3) applied in spring on top of snow and (4) check plot, no manure applied. Treatments on the 4 alfalfa plots (both the newly seeded and the 6-year-old) consisted of 44.8 metric tons/ha solid dairy manure, wet basis, (1) applied in fall on frozen ground, and (2) applied in spring on top of snow. During the second year of the experiment, the spring manure treatment on the established alfalfa plot was eliminated and the plot was used as a check with no manure applied. Third year treatments on the 4 alfalfa plots were changed to: (1) check, (2) 1.27 cm liquid dairy manure applied in fall on frozen ground, (3) 1.27 cm liquid dairy manure applied in spring on top of snow, and (4) 0.64 cm liquid dairy manure applied in fall followed by another 0.64 applied in spring. Study results indicated that concentrations of nutrients in runoff water were much higher from the manured plots than from the check plots, but the total nutrient losses in surface runoff from the manured plots were not much greater due to the efficiency of the manure in retarding runoff and soil loss. Manure spread on top of snow rather than before snowfall was generally better for reducing soil, water, and nutrient losses. Applying manure to frozen plowed land reduced soil losses 100% and runoff up to 80%. (Albertson-East Central)
W78-00129

NITROGEN AND PHOSPHORUS: FOOD PRODUCTION, WASTE AND THE ENVIRONMENT.
New York State Coll. of Agriculture and Life Sciences, Ithaca.
Ann Arbor Science Publishers, Inc., Ann Arbor, Michigan, 1975. 372 p. K. S. Porter, Editor.

Descriptors: *Water pollution, *Nitrogen, *Phosphorus, *Agricultural runoff, Economics, Regulation, Model studies, *Farm wastes, *Pollution abatement.
Identifiers: Waste management.

Studies are described that concern the interwoven issues of maintaining agricultural efficiency and protecting the environment. Special consideration was directed toward the substances nitrogen and phosphorus. Sources of nitrogen and phosphorus found in streams and lakes in central New York were identified. Estimates of the quantities involved were made and their effects on lakes were assessed with regard to management alternatives. Management of manure from treatment to direct disposal on land, and the application of fertilizer were studied. The economic consequences of applying controls to reduce nutrient losses from farm land were estimated. Finally, social issues, such as public attitudes toward pollution and the efficiency of institutions responding to such attitudes were examined in a comprehensive sociological investigation. An effort was made to consider all the major ramifications of nutrient flows in agricultural watersheds. Consequently, the members of the research team represented the following academic disciplines: agricultural economics, agricultural engineering, agronomy, limnology, sociology, and systems analysis. The report was written for both the interested layman and the scientific community. (See W78-00131 thru W78-00133) (Merryman-East Central)
W78-00130

THE INFLUENCE OF HUMAN ACTIVITY ON THE EXPORT OF PHOSPHORUS AND NITRATE FROM FALL CREEK,
Cornell Univ. Agricultural Experiment Station, Ithaca, NY. Dept. of Agronomy.
D. R. Bouldin.
In: Nitrogen and Phosphorus: Food Production, Waste and the Environment. Ann Arbor Science Publishers, Inc., Ann Arbor, Michigan, 1975. p 61-120. 12 fig, 23 tab, 16 ref.

Descriptors: *Water pollution sources, *Phosphorus, Agricultural runoff, Sewage, Watershed management, Farm wastes.
Identifiers: Fall Creek Watershed(NY).

A discussion is given of the influence of human activities on the phosphorus and nitrate removed from the Fall Creek watershed in the stream discharge. Samples were taken during both high and low discharge rates at approximately 20 locations on an irregular basis. The following conclusions were drawn concerning phosphorus: (1) In Fall Creek, the concentration of soluble phosphorus was about 30 micrograms per liter and the particulate matter contained about 110 microgram P/l. Most of the latter phosphorus was carried out of the watershed during the short intervals of time when the discharge rate was very high. (2) The soluble phosphorus is probably the form most important to the biology of the lakes. (3) About 50% of the soluble phosphorus was attributed to non-human activities, about 25% was attributed to farming operations. (4) Based on the Fall Creek data and numerous other considerations, the loading of soluble phosphorus to lakes in central New York can be approximated by the sum of the following inputs: (a) Sewered populations: (i) phosphorus in laundry detergents 1.0 (plus or minus 0.5) kg P/cap/yr. (ii) No phosphorus in laundry detergent 0.5 (plus or minus 0.4) kg P/cap/yr. (b) Unsewered population: 0.1 to 0.4 of the values for sewered population on a per cap/yr basis. (c) Nonagricultural land: 15D mg/m2/yr, where D is meters of stream flow per m2 year. Probably the range is 10D to 20D. (d) Agricultural land (in excess of 15R): 18D mg/m2yr, where D is meters of stream flow per m2yr. Probably the range is 10D to some unknown upper limit. The following conclusions were drawn in relation to nitrogen: (1) No samples were found any place at any time in which the NO3-N concentration was a health hazard. (2) The seasonal pattern of nitrate concentrations was similar among the years with minimum concentrations occurring during the summer and maximum concentrations occurring during the winter. (3) Corn land and domestic sewage were judged to be the most likely major sources of NO3. (See also W78-00130) (Albertson-East Central)
W78-00131

FLOWS OF NITROGEN AND PHOSPHORUS ON LAND,
New York State Coll. of Agriculture and Life Sciences, Ithaca. Dept. of Agricultural Engineering.
K. S. Porter, D. A. Lauer, J. J. Meisinger, and D. R. Boulding.
In: Nitrogen and Phosphorus: Food Production, Waste and the Environment. Ann Arbor Science Publishers, Inc., Ann Arbor, Michigan, p 123-165. 1975. 11 fig, 8 tab, 16 ref.

Descriptors: *Nitrogen, *Phosphorus, Leaching, Ammonia, Groundwater, Crop response, *Agricultural runoff, Legal aspects, Economics, *Path of pollutants, *Water pollution sources, Air pollution, Farm wastes, Waste disposal.
Identifiers: Soil-plant system, Volatilization, Land disposal, Air quality.

An attempt is made to determine the relationship between management of farming operations and translocation of nitrogen and phosphorus from farmed land. General characteristics of nitrogen and phosphorus in relation to the soil-plant system are outlined and overall nitrogen and phosphorus budgets are briefly discussed. Two specific investigations are described, illustrating the removal of nitrogen from land, in one case by air and in the other by water. Studies of the flow of nitrogen and phosphorus on or from soil using detailed mathematical models are also described. These models considered the management of nutrients designed to minimize the losses, while evaluating the corresponding effect on crop yield, and consequent return. Results showed that nutrient losses from agriculture cannot be entirely eliminated, but some practical steps may be taken to reduce the rate of losses. Methods of cultivation and nutrient application should be encouraged which would reduce losses with least financial penalty and possibly with a gain. (See also W78-00130) (Albertson-East Central)
W78-00132

ECONOMIC ANALYSIS OF REDUCING PHOSPHORUS LOSSES FROM AGRICULTURAL PRODUCTION,
Cornell Univ. Agricultural Experiment Station, Ithaca, NY. Dept. of Agricultural Economics.
G. L. Casler, and J. J. Jacobs.
In: Nitrogen and Phosphorus: Food Production, Waste and the Environment, Ann Arbor Science Publishers, Inc., Ann Arbor, Michigan, p 169-215. 1975. 12 fig, 18 tab, 22 ref.

Descriptors: *Water pollution, Linear programming, Model studies, *Agricultural runoff, Feed lots, Dairy industry, Economics, Regulation, Farm wastes, Economics.
Identifiers: Cayuga Lake(NY), Barnyard runoff, Waste management.

An attempt was made to estimate the costs of reducing phosphorus inputs to Cayuga Lake from the Fall Creek watershed. In estimating costs, 3 sources of phosphorus were considered: (1) land runoff as related to soil erosion, (2) land runoff as related to manure applications, and (3) barnyardd runoff. The cost of reducing phosphorus losses from land runoff was estimated by using a linear programming model of agriculture in the Fall Creek watershed. Development of the model utilized the following information: (1) production alternatives, (2) costs and returns associated with each alternative, and (3) phosphorus loss from each production practice. Manure handling systems which include storage tend to decrease nutrient losses to water. However, costs of dairy manure handling would be increased by such storage and such problems as odor and flies would be increased. Consequently, trade-offs between nutrient losses to water and other environmental characteristics must be considered. Barnyard runoff was considered in relation to the 1973 EPA effluent limitation proposed guidelines for the feedlots category of point sources. These regulations were focused on large feedlots and on dairy operations having 700 or more dairy cattle. Farm business records and a runoff survey were utilized to obtain the: (1) distribution of farms for specified size groups; (2) barnyard area per cow for specified size groups; (3) location of the barnyard relative to a stream or road ditch; and (4) number of farms that have a barnyard. Using this information plus rainfall and cost data, the costs of constructing runoff control facilities for 3 herd sizes were computed. Study results indicated reduction of phosphorus from the effluent of various sewage treatment plants discharging to the lake or its tributaries appeared to be relatively low cost, and should be adopted. If further phosphorus reduction is needed, barnyard runoff control should be the next priority. Last of all, manure handling practices should be considered. (See also W78-00130) (Albertson-East Central)
W78-00133

CHROMIUM SPECIATION IN MUNICIPAL WASTEWATER AND SEAWATER,
Southern California Coastal Water Research Project, El Segundo.
T-K. Jan, and D. R. Young.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 15-22, 1977. 5 tab, 1 ref.

Descriptors: *Water pollution sources, *Chemical wastes, *Outfall sewers, *Heavy metals, *Municipal wastes, *Chromium, California, Continental shelf, Resources development, Environmental effects, Waste disposal.
Identifiers: *Outer Continental Shelf, *Coastal zone, Hexavalent chromium, Resources management, Southern California.

The majority of dissolved chromium found in clean coastal seawater off southern California is hexavalent chromium. The sums of the concentrations of dissolved trivalent and hexavalent chromium measured in samples are in good agreement with the values for total dissolved chromium measured by an independent process. Subsurface seawater samples, known by their high levels of turbidity, ammonium-nitrogen, and particulate metals to have come from within the JWPCP wastewater plume, contained concentrations of particulate chromium up to 50 times control levels. In contrast, the concentrations of dissolved trivalent chromium in the plume samples were only 2 to 4 times background values, and those of dissolved hexavalent chromium showed no significant enhancements. There appears to be a relatively high natural background of dissolved hexavalent chromium in coastal seawater. The low percentage of municipal wastewater chromium that occurs in this toxic form (plus the apparent lack of conversion of other forms of chromium to it) indicate that significant increases in seawater concentrations of hexavalent chromium do not result from ocean discharge of these wastewaters. (See also W78-00134) (Sinha-OEIS)
W78-00135

INPUTS OF DDT AND PCB,
Southern California Coastal Water Research Project, El Segundo.
D. R. Young, and T. C. Heesen.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 23-30, 1977. 1 fig, 3 tab.

Descriptors: *Municipal wastes, *Water pollution sources, *Polychlorinated biphenyls(PCB's), *DDT, *Chlorinated hydrocarbon pesticides, California, Continental shelf, Resources development, Environmental effects.
Identifiers: *Outer Continental Shelf, *Southern California Bight, Resources management.

Work has focused on the pesticides DDT and Dieldrin and two industrially important polychlorinated biphenyls (PCB's), Arochlors 1242 and 1254. Attempts have been made to quantify the amounts of these substances in municipal and industrial wastewaters, vessel antifouling paints, surface runoff, and aerial fallout; amounts entering and leaving the Bight via ocean currents have also been estimated. Submarine introduction of DDT-contaminated particulates has been reduced by more than 95% since 1971. PCB emissions via submarine outfalls have decreased by an order of magnitude since 1972. Surface runoff has made only second-order contributions of chlorinated hydrocarbons to the Bight, almost all from storm flow. Since 1974 dry aerial fallout has been the dominant route by which total DDT is transferred from southern California to the coastal ecosystem; for 1254 PCB, this situation may have existed even earlier. However fallout rates of both contaminants in this region are slowly decreasing. (See also W78-00134) (Sinha-OEIS)
W78-00136

INPUTS OF CHLORINATED BENZENES,
Southern California Coastal Water Research Project, El Segundo.
D. R. Young, and T. C. Heesen.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 31-37, 1977. 3 tab, 9 ref.

Descriptors: *Water pollution sources, *Chlorinated hydrocarbon pesticides, *Municipal wastes, California, Continental shelf, Resources, Environmental effects.
Identifiers: *Outer Continental Shelf, *Southern California Bight, Ocean outfall, *Hexachlorobenzene, *Chlorobenzenes.

During the course of EPA-sponsored investigation into levels of chlorinated pesticides and PCB's in major municipal wastewaters of southern California, several other chlorinated compounds of potential concern were uncovered. The first was hexachlorobenzene (HCB), which was tentatively identified in spring 1974 samples. This material was repeatedly detected in semi-annual analyses of final effluents by electron-capture gas chromatography. The total body of data indicate that HCB is present in local wastewaters at levels one to two orders of magnitude below those measured for PCB. It appears that concern regarding chlorinated hydrocarbons in municipal and other wastewaters, should be expanded to cover the chlorobenzenes as well. Although attention has recently been focused on HCB, data indicate that other chlorinated benzenes of possible greater importance are also being discharged to our coastal marine waters. (See also W78-00134) (Sinha-OEIS)
W78-00137

TECHNIQUES FOR COLLECTING DDT AND PCB IN AERIAL FALLOUT,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5A.
W78-00138

AERIAL FALLOUT OF METALS DURING A BRUSHFIRE,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5A.
W78-00139

SEDIMENTS AS SOURCES OF DDT AND PCB,
Southern California Coastal Water Research Project, El Segundo.
D. R. Young, and D. McDermott-Ehrlich.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 49-55, 1977. 2 fig, 3 tab.

Descriptors: *Water pollution sources, *Sediments, *Outfall sewers, *DDT, *Polychlorinated biphenyls, California, Pesti-

cides, Fish, Resources development, Environmental effects, Continental shelf.
Identifiers: *Outer continental shelf, Southern California, Resources management.

The relatively high concentrations of DDT and PCB compounds found in bottom sediments and fish from the region of the Los Angeles County's Joint Water Pollution Control Plant (JWPCP) discharge off Palos Verdes have been described in past reports. During the last 4 years, the mass emissions of these contaminants from this submarine outfall system have been reduced through control of industrial inputs and general use restrictions. However, studies over the same years have revealed that DDT and PCB concentrations in the tissues of bottom-feeding fish of the region do not reflect these reductions. These findings are summarized here, along with a discussion of the role that contaminated bottom sediments appear to play in this situation. It is estimated that approximately 150 tons of total DDT are still contained in the upper 30 cm of these sediments in a 50 aq-km area off Palos Verdes Peninsula. These highly-contaminated sediments may cause excessive DDT levels to persist for many years in benthic fishes of the region. (See also W78-00134) (Sinha - OEIS)
W78-00140

CHARACTERISTICS OF MUNICIPAL WASTEWATER DISCHARGES, 1975,
Southern California Coastal Water Research Project, El Segundo.
H. A. Schafer.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 57-60, 1977. 4 tab.

Descriptors: *Water pollution sources, *Municipal wastes, *Outfall sewers, *DDT, *Heavy metals, *Polychlorinated biphenyls, California, Pesticides, Continental shelf, Resources development, Environmental effects.
Identifiers: *Outer continental shelf, Southern California, Resources management.

Municipal wastewater discharges are the principal sources of most pollutants entering southern California waters as a result of human activity. Between 1971 and 1974, all of the general constituents showed a slight decrease. Trace metals and PCB remained relatively constant, and DDT decreased by a factor of 10. However between 1974 and 1975, there were several significant changes: The combined annual mass emission rate of total suspended solids increased by about 10% although the total flow of wastewater increased less than 1%. The combined mass emission rates for all measured metals except silver were lower than the 1974 dates; these reductions, which ranged from 6% for cadmium to 25% for mercury, appear to be the result of improved source control of metals. Total DDT values continued to decline, and the combined mass emission rate for 1975 was 6% lower than the 1974 value. The average reported amount of total PCB declined 35%, however it is not certain whether this decrease reflects actual reductions in effluent concentrations or refinements in analytical procedures. (See also W78-00134) (Sinha - OEIS)
W78-00141

MEASUREMENTS OF SUBTHERMOCLINE CURRENTS,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5A.
W78-00142

CURRENT VELOCITIES REQUIRED TO MOVE SEDIMENTS,
Southern California Coastal Water Research Project, El Segundo.
T. Hendricks.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 71-76, 1977. 4 fig, 1 tab.

Descriptors: *Water pollution sources, *Sediment transport, *Dispersion, *Pollutants, Continental shelf, California, Resources development, Environmental effects.
Identifiers: *Outer continental shelf, Southern California, Current velocities.

The distribution of effluent-related sediments around and outfall, and the changes that have been observed in the properties of these sediments, suggest that the sediments may undergo substantial reworking by the near-bottom currents. The substantially reduced resuspension and initiation of motion velocities observed near the outfalls, relative to the more distant sediments in the same depth of water, suggest that outfall-related sediments may be reworked more frequently by the bottom currents, particularly as the organic content of these sediments increases. Estimates indicate that resuspension may occur during more than one-third of the year near the Whites Point outfall. Infrequent, large swell-perhaps occurring only a few times each decade--can rework all the sediments at this depth. At this time, the more organic, lighter weight, sewage particulates are more likely to be swept away and dispersed over a mucn larger area than natural particulates. (See also W78-00134) (Sinha - OEIS)
W78-00143

SLUDGE IN SANTA MONICA BAY,
Southern California Coastal Water Research Project, El Segundo.
H. A. Schafer, and W. Bascom.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 77-82, 1977. 3 fig, 2 tab, 1 ref.

Descriptors: *Water pollution sources, *Sludge, *Outfall sewers, *Pollutants, *Sediments, *Ecology, Environmental effects, Aquatic animals, Fish, Benthos, California, Continental shelf, Resources development.
Identifiers: *Outer continental shelf, Southern California, Resources management, Santa Monica Bay.

The ecological effects of the sludge issuing from the Hyperion 7-mile outfall are a matter of considerable public as well as scientific interest. The bottom in the outfall area has recently been reexamined and samples of sediments have been analyzed for pollutants and for marine life. The size of the area of bottom containing a significant amount of sludge is about 2 sq km, or about 1% of Santa Monica Bay. The area is in water over 100 meters deep and 12 km offshore at the head of a submarine canyon. The sludge discharge has changed the ecology by increasing the number of fish and benthic animals and by decreasing the number of species of benthic animals. The material does not seem to be moving as a body, however it must be constantly dissipating, probably through the consumption of organic materials by animals and the drift of small particles offshore into deeper water. These recent measurements show that the situation is stable, apparently not having changed substantially for at least the last 5 years. (See also W78-00134) (Sinha - OEIS)
W78-00144

MERCURY IN SEDIMENTS,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5A.
W78-00145

CHANGES IN THE GRAIN SIZE OF SEDIMENTS ON THE PALOS VERDES SHELF,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 2J.
W78-00146

VIRUSES AND BACTERIA IN COASTAL WATERS AND SHELLFISH,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5A.
W78-00147

UPTAKE AND EFFECTS OF CHROMIUM ON MARINE FISH,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5C.
W78-00151

FIN EROSION DISEASE INDUCED IN THE LABORATORY,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5C.
W78-00155

SUPERTANKERS AND SUPERPORTS (CITATIONS FROM THE ENGINEERING INDEX DATA BASE).
National Technical Information Service, Springfield, VA.
Available from the National Technical Information Service, Springfield, VA 22161 as NTIS/PS-76/0592, Price codes: E13 in paper copy, E13 in microfiche. National Technical Information Service, Habercom, G. E., Jr. (Ed.) Report NTIS/PS-76/0592, July 1976. 100 p, 75 ref.

Descriptors: *Bibliographies, *Environmental effects, *Water pollution sources, *Transportation, Resources development, Harbors.
Identifiers: *Outer continental shelf, *Supertankers, *Superports, Terminal facilities, Moorings.

Construction and operation of supertankers and requirements for port facilities are reviewed in these reports gathered from worldwide literature surveys. Environmental aspects, offshore mooring sites, and harbor preparation are among the features investigated. This published search was produced by searching the data base of Engineering Index, Inc., COMPENDEX. The 75 abstracts and citations contained in this document are copyrighted by Engineering Index, Inc. (Sinha - OEIS)
W78-00164

DISPOSAL OF ORGANOCHLORINE WASTES BY INCINERATION AT SEA,
Environmental Protection Agency, Washington, DC. Office of Water and Hazardous Materials.
For primary bibliographic entry see Field 5E.
W78-00165

MEAT PACKINGHOUSE WASTEWATER: CHARACTERIZATION BY SOURCE,
Texas Univ. at El Paso. Dept. of Civil Engineering.
W. D. Vandertulip.
Master of Science Thesis, May 1975. 100 p, 16 fig, 21 tab, 28 ref, 3 append.

Descriptors: *Data collections, *Flow measurement, *Food processing industry, *Waste identification, Water analysis, Biochemical oxygen demand, Chemical analysis, Oil wastes, Chlorides, Texas, Waste water treatment.
Identifiers: *Meat packing wastes, *Rendering wastes, Paunch manure, Blood, Grease, Waste loads.

Processes that generate wastewater within the meat processing industry and waste loads from the different unit processes are discussed. The U.S. Dept. of Agriculture places meat slaughtering and packing second in potential daily load of pollution

in terms of lbs. of BOD; it is the number one polluter in the food and kindred products industry. Wastewater at a packinghouse is generated at many locations, each with its own peculiar chemical properties. Waste load data from various referenced authors are included. Kreis (1972) reported the COD, BOD5, and TOC of runoff from cattle holding pens to be 7510 mg/l, 2010 mg/l, and 1075 mg/l respectively. Crandall (1971) reported a value of 100,000 mg/l BOD5 for blood and Bauman (1971) reported the BOD5 of paunch manure as 50,200 mg/l; both data taken from the killing floor. Waste load data from referenced authors on other pollution sources are presented; high COD from grease from the rendering process and high chloride content from the pickling brine injection process are the main pollution contributors. Plant processes, flow measurement, and chemical analysis by 'standard methods' for the Peytons Meat Packing Plant, El Paso, Texas are discussed. Conclusions from data of the referenced authors and from the plant study are tabulated. (Prodehl-EPA, Corvallis)
W78-00166

INITIAL ASSESSMENT OF THE GROUND-WATER RESOURCES IN THE MONTEREY BAY REGION, CALIFORNIA,
Geological Survey, Menlo Park, CA. Water Resources Div.
K. S. Muir.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-271 657, Price codes: A03 in paper copy, A01 in microfiche. Water-Resources Investigations 77-46, August 1977. 33 p, 5 fig, 3 tab, 80 ref.

Descriptors: *Water pollution sources, *Path of pollutants, *Groundwater basins, *Groundwater resources, *Aquifer characteristics, *California, Water wells, Pumping, Drawdown, Chemical degradation, Water quality, Saline water intrusion, Municipal wastes, Septic tanks, Solid wastes, Landfills, Evaluation.
Identifiers: *Monterey Bay region(Calif).

Because urban growth has placed an increasing demand on the ground-water resources of the Monterey Bay region, Calif., an assessment of the ground-water conditions was made to aid the development of local and regional plans. Ground water provides 80 percent of the water used in the region, which includes six ground-water subbasins. In several of the subbasins, pumpage exceeds safe yield. Existing water-quality degradation results from seawater intrusion, septic-tank effluent, and irrigation-return water. Potential sources of degradation include municipal sewage disposal, leachates from solid-waste disposal sites, and poor-quality connate water. High-priority items for future study include location of recharge areas, detection of seawater intrusion, and well-monitoring of landfill sites. (Woodard-USGS)
W78-00188

SUMMARY GROUND-WATER RESOURCES OF LUZERNE COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, PA. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-00193

EFFECTS OF DRAIN WELLS ON THE GROUND-WATER QUALITY OF THE WESTERN SNAKE PLAIN AQUIFER, IDAHO,
Geological Survey, Boise, ID. Water Resources Div.
H. R. Seitz, A. M. La Sala, Jr., and J. A. Moreland.
Open-file report 76-673, 1977. 34 p, 8 tab, 7 fig, 15 ref.

Descriptors: *Path of pollutants, *Injection wells, *Industrial wastes, *Septic tanks, *Urban runoff, Aquifers, Waste water disposal, Water quality, Water pollution sources, Nutrients, Bacteria, Sodium, Chlorides, Water temperature, *Idaho.
Identifiers: *Western Snake Plain aquifer(Idaho).

Approximately 3,100 drain wells injects irrigation waste water, urban runoff, septic-tank effluent, and industrial waste water into the Snake Plain aquifer in Minidoka, Gooding, Jerome, and Lincoln Counties, Idaho. About 29,000 acre-feet of irrigation waste water, 100 acre-feet of urban runoff, 400 acre-feet of septic-tank effluent, and 1,000 acre-feet of industrial waste water are injected annually. The quality of irrigation waste water is highly variable, depending upon its source, method and rate of application, amount of fertilizer added, and other factors. The quality of urban runoff water is generally much better than irrigation waste water. Septic-tank effluent is relatively high in nutrient concentrations. Chloride concentrations also are high, and bacterial concentrations are exceedingly high. The only industrial waste water sampled during this study had been used for cooling. No chemical changes were noted, but temperature was significantly increased. The data indicate that drain-well inflow does move appreciable distances through the aquifer and can be detected in downgradient wells. (Woodard-USGS)
W78-00197

LOW-FLOW CHARACTERISTICS AT GAGING STATIONS ON THE WISCONSIN, FOX, AND WOLF RIVERS, WISCONSIN,
Geological Survey, Madison, WI. Water Resources Div.
W. A. Gebert, and B. K. Holmstrom.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-270 946, Price codes: A02 in paper copy, A01 in microfiche. Water-Resources Investigations 77-27, June 1977. 20 p, 2 fig, 4 tab, 3 ref.

Descriptors: *Low flow, *Low flow frequency, *Streamflow, *Gaging station, *Wisconsin, Data collections, Flow characteristics, Waste water disposal, Path of pollutants, Regulated flow.
Identifiers: *Log Pearson, *Unregulated streamflow, *Wisconsin River(Wis), *Fox River(Wis), *Wolf River(Wis).

Low-flow characteristics are presented at 11 gaging stations on the main stem of the Wisconsin, Fox, and Wolf Rivers in Wisconsin. To provide accurate and consistent low-flow characteristics for uniform evaluation of waste effluent, a long-term period of streamflow record (1915-75) was used for the analyses, The annual minimum 7-day mean flow that occurs on the average of once in 10 years (Q7,10) on the Wisconsin River ranged from 140 cfs (Cubic feet per second) at the gaging station at Rainbow Lake to 2,790 cfs at the Muscoda gaging station. On the Fox-Wolf Rivers, the Q7,10 ranged from 360 cfs at Fox River at Berlin to 950 cfs at Fox River at Rapide Croche dam. The analyses showed that the severe drought of the 1930's makes a substantial change in the Q7,10 discharge while the effect of regulation apparently makes little difference in the Q7,10 discharge at the Merrill gaging station. (Woodard-USGS)
W78-00204

NATURE AND EXTENT OF GROUND-WATER-QUALITY CHANGES RESULTING FROM SOLID-WASTE DISPOSAL, MARION COUNTY, INDIANA,
Geological Survey, Indianapolis, IN. Water Resources Div.
R. A. Pettijohn.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-271 019, Price codes: A07 in paper copy, A01 in microfiche. Water-Resources Investigations 77-40, June 1977. 119 p, 49 fig, 15 tab, 26 ref.

Descriptors: *Landfills, *Leachate, *Path of pollutants, *Groundwater movement, *Solid wastes, Aquifers, Sampling, Observation wells, Water quality, Dispersion, *Indiana, Hydraulic conductivity, Chemical analysis, Infiltration, Metals, Organic wastes, Pumping, Self purification.
Identifiers: *Indianapolis area(Ind).

Studies of seven landfills in the Indianapolis, Indiana, area indicate that in five of the landfills movement of ground water is from the deep aquifers into the uppermost aquifer. In the other two landfills, movement of ground water is from the shallow aquifers to the deeper aquifers, so that leachate is transported into the deeper aquifers. In all the landfills, the predominant direction of ground-water movement is lateral. Placing solid waste into the landfills has occasionally altered the local, but not the regional, flow patterns. Groundwater mounding at shallow depths beneath two of the landfills has caused flow toward the edges of the two fills. Leachate at these fills is moving downward and outward and has affected water quality at shallow depths. Pumping near two other landfills has reversed the direction of regional ground-water flow, allowing leachate to move toward the pumping wells. Leachate at the three remaining landfills is moving downgradient and is discharging into single streams adjacent to each landfill. (Woodard-USGS)
W78-00205

EVALUATION OF GROUND-WATER QUALITY IN THE SANTA MARIA VALLEY, CALIFORNIA,
Geological Survey, Menlo Park, CA. Water Resources Div.
J. L. Hughes.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-271 512, Price codes: A03 in paper copy, A01 in microfiche. Water-Resources Investigations 76-128, July 1977. 72 p, 18 fig, 8 tab, 18 ref.

Descriptors: *Groundwater, *Chemical degradation, *Pumping, *Groundwater recharge, *Hydrologic budget, Water quality, Solutes, Industrial wastes, Municipal wastes, Agricultural chemicals, Irrigation water, Rain water, Sewage treatment, Drawdown, Groundwater movement, Water pollution sources, Nitrogen, Evaluation, *California.
Identifiers: *Santa Maria Valley(Calif).

The quality and quantity of recharge to the Santa Maria Valley, Calif., ground-water basin from natural sources, point sources, and agriculture are expressed in terms of a hydrologic budget, a solute balance, and maps showing the distribution of select chemical constituents. Point sources includes a sugar-beet refinery, oil refineries, stockyards, golf courses, poultry farms, solid-waste landfills, and municipal and industrial wastewater-treatment facilities. Pumpage has exceeded recharge by about 10,000 acre-feet per year. The result is a declining potentiometric surface with an accumulation of solutes and an increase in nitrogen in ground water. Nitrogen concentrations have reached as much as 50 milligrams per liter. In comparison to the solutes from irrigation return, natural recharge, and rain, discharge of wastewater from municipal and industrial wastewater-treatment facilities contributes less than 10 percent. The quality of treated wastewater is often lower in select chemical constituents than the receiving water. (Woodard-USGS)
W78-00206

HYDROLOGY OF THE CREEPING SWAMP WATERSHED, NORTH CAROLINA, WITH REFERENCE TO POTENTIAL EFFECTS OF STREAM CHANNELIZATION,
Geological Survey, Raleigh, NC. Water Resources Div.
For primary bibliographic entry see Field 4A.
W78-00207

NATIONAL WATER QUALITY INVENTORY. 1974 REPORT TO THE CONGRESS. VOLUME I.
Environmental Protection Agency, Washington, DC. Office of Water Planning and Standards.
For primary bibliographic entry see Field 5A.
W78-00214

FACTORS AFFECTING DIMETHYLNITROSAMINE FORMATION IN SAMPLES OF SOIL AND WATER,
Cornell Univ. Agricultural Experiment Station, Ithaca, NY. Dept. of Agronomy.
A. L. Mills, and M. Alexander.
Journal of Environmental Quality, Vol. 5, No. 4, p 437-440, 1976. 5 fig, 2 tab, 16 ref.

Descriptors: *Pollutants, *Water pollution effects, *Soil contamination, *Enzymes, Microorganisms, Pesticides, Nitrites, Nitrates, Nitrogen compounds, Organic matter, Sewage.
Identifiers: *Nitrosamines, *Dimethylnitrosamine, *DMNA, *Carcinogens, Amines, Dimethylamine, DMA, Trimethylamine.

Nitrosamines are formed in soil, sewage, and lake water after certain nitrogen compounds are introduced. Dimethylnitrosamine (DMNA) appears when soils and waters are amended with nitrate or nitrite and either dimethylamine (DMA) or trimethylamine. Certain pesticides may also, when decomposing, give rise to one of the precursors of this carcinogenic nitrosamine. This study was designed to clarify the role played by microorganisms in the formation of DMNA from DMA in soil and water. It was found that DMNA formation occurred as readily in sterilized soil, sewage, and lake water samples as in nonsterilized samples. Although microorganisms may carry out an enzymatic nitrosation in some soils and waters, particularly those at near-neutral pH values, DMNA can form in soil and water even at near-central conditions by a nonenzymatic reaction. To determine whether organic matter promoted nitrosation, silt loam samples were freed of organic matter. The quantity of DMNA in the samples decreased as the organic matter concentration fell. These data suggest that organic matter is important in the promotion of nitrosation in the presence of the requisite precursors. Organic matter is not the only factor controlling nitrosamine formation; pH certainly plays a role. DMNA formation increased slightly as the pH decreased. (Lynch-Wisconsin)
W78-00215

CRITERIA FOR THE ECOLOGIC EVALUATION OF THE LOWER RIVER MAIN: II. INVESTIGATIONS OF THE ORGANIC METABOLIC PROCESSES, (IN GERMAN),
Forschunginstitut und Natur-Museum Senckenberg, Frankfurt am Main (West Germany).
W. Tobias.
Cour Forschungsinst Senckenb 18, p 1-137, 1976.

Descriptors: *Organic compounds, *Metabolism, Ecology, Oxygenation, *Degradation(Decomposition), Rivers, Water quality standards, Evaluation.
Identifiers: *Lower Main River(West Germany).

The ecology of the lowest reaches of the Main river (West Germany) is discussed. Problems of decomposition of organic compounds resulting from man's activities, including interactions of biological, chemical and physical processes within the watercourse are discussed. Kinzig stream (right-hand tributary close to the town of Hanau) contributes positively with its well oxygenated and richly mineralized water to the water quality of the Main. The left-hand tributaries Gersprenz and Rodau, and the Nidda on the right bank near Frankfurt are heavily polluted at their mouths. The influence of residual sewage effluents from purification plants on the condition of smaller running waters (Erlenbach) in the river system of the Nidda are considered. (See also W76-05057)--Copyright 1976, Biological Abstracts, Inc.
W78-00217

ATMOSPHERIC NITROGEN FIXATION BY FREE-LIVING MICROORGANISMS: PART 2. THE EFFECT OF TEMPERATURE AND MOISTURE ON THE DEVELOPMENT OF NITROGEN-FIXING MICROORGANISMS AND THE PROCESS OF BIOLOGICAL NITROGEN FIXATION,
Akademiya Nauk SSSR, Novosibirsk. Inst. of Soil Sciences and Agrochemistry.
I. L. Klevenskaya.
Izv Sib Otd Adad Nauk SSSR Ser Biol Nauk 1, p 59-62, 1976.

Descriptors: *Nitrogen fixation, *Bacteria, *Soil temperature, *Soil moisture, Pseudomonas, Microorganisms, Ecosystems.
Identifiers: Bacillus-mucilaginosus, Bacillus-oligonitrophilus, Pseudomonas-fluorescens.

The process of N fixation in the culture medium was determined to be most intensive at 26 C. The N-fixing capacity of some N fixers (Pseudomonas fluoresens, Bacterium sp., Bacillus oligonitrophilus, B. mucilaginosus) was revealed at temperatures close to 0 degrees. The significance of soil temperature and moisture for development of N-fixing microorganisms was found to be unequal in different ecosystems.--Copyright 1977, Biological Abstracts, Inc.
W78-00220

DISTRIBUTION OF HEAVY METALS IN THE SEDIMENT OF AN UNPOLLUTED ESTUARINE ENVIRONMENT,
Imperial Chemical Industries, Ltd. Brixham (England). Brixham Research Lab.
D. Taylor.
The Science of the Total Environment, Vol. 6, p. 259-264, 1976. 3 fig, 3 tab, 9 ref.

Descriptors: *Metals, *Estuaries, Cadmium, Cobalt, Copper, Lead, Manganese, Mercury, Nickel, Zinc, Spectrophotometry, Sediments, Spatial distribution, *Path of pollutants, Water pollution sources.
Identifiers: *Urr Water River(Solway Estrary United Kingdom).

Distributions of cadmium, cobalt, copper, lead, manganese, mercury, nickel and zinc in sediments of Urr Water, in the relatively-unpolluted Solway estuary, United Kingdom, provides a baseline for comparison with similar geochemical areas subject to pollution. Wet samples obtained at 19 stations from surface sediment layers were leached with acid (HC1: HNO3=3:1), at 140C. The metals were then determined by concentional atomic absorption spectrophotometry (using a cold vapor technique for mercury). Data for Urr Water are divided into two sections: dealing with the fresh water zones above the tidal limits (stations 1-7), and of the estuarine zone between the tidal limits and mouth (stations 11-19). Arithmetic means, maximum and minimum values for each metal are given for the estuary and river. Simple linear regression analysis shows that there is apparently little correlation between the silt content and any of the metal concentrations. This finding, in agreement with other recent work, confirms the view that an inverse relationship between particle size and trace metal content does not necessarily exist in all marine sediments. (Spaeth-Wisconsin)
W78-00224

ACID PRECIPITATION IN CANADA,
Department of the Environment, Ottawa (Ontario).
P. W. Summers, and D. M. Whelpdale.
Water, Air, and Soil Pollution, Vol. 6, No. 2-4, Sept.-Nov. 1976, p. 448-455. 2 fig, 1 tab, 12 ref.

Descriptors: *Air pollution, *Rain water, *Precipitation(Atmospheric), *Canada, Sulfates, Nitrates, Acidic water, Water pollution sources, Toxins, Electric powerplants, Projections.
Identifiers: *Acid rain, Oil Sands region(Alberta).

Data is reviewed on precipitation in Canada with respect to sulphate and nitrate contents and in some cases to pH levels. The occurrence of acid rain (atmospheric precipitation with high sulphate and/or nitrate contents) of five geographical regions is discussed as related to the main source areas of emissions, to meteorological conditions and to precipitation type. Two regions are particularly affected. In central Alberta, downwind of the natural gas processing plants, the rain is only slightly acid in spite of relatively high sulphate and nitrate concentrations in the region. However, a potential problem exists in the Oil Sands region of the province due to emissions from an oil extraction plant. The second receptor region is southern Ontario with possible extensions into southern Quebec and the Atlantic provinces. In this region, high sulphate (2.0-7.0 ppm on the average) and hig nitrate (1.0-6.0 ppm) concentrations contribute to the acidity of precipitation. With increases in the use of coal for generating electrical power in North America, it is predicted that emissions of both sulphate and nitrate concentrations will increase--especially if tall stacks are used in coal processing. Because many of these emissions will occur in the heavily populated industrial regions already receiving acid rain, the extent of the affected areas will increase. (Harris-Wisconsin)
W78-00227

THE FATE OF SELECT PESTICIDES IN THE AQUATIC ENVIRONMENT,
Southeast Environmental Research Lab., Athens, Ga.
J. R. Sanborn.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-239 749, Price codes: A05 in paper copy, A01 in microfiche. Report EPA-660/3-74-025, December 1974. 83 p. 43 tab, 64 ref. R-800736.

Descriptors: *Pesticides, *Herbicides, *Insecticides, *Fungicides, *Miticides, *Model studies, Pesticide residues, Biodegradation, Ecosystems, Fish, Gastropods, Algae, Daphnia, Mosquitoes, Insects, Pesticide toxicity, Dieldrin, 2, 4-D, Aroclors, Sorghum.
Identifiers: *Plasticizers, Uptake, Bux, Sevin, Carbofuran, Lindane, Orthene, Parathion, Alachlor, Propachlor, Bladex, Bentazon, Dicamba, Pyrazon, Trifluralin, Banomite, DOP, PCB's, Captan, Hexachlorophene.

A terrestial-aquatic model ecosystem was used to test the persistence and uptake of 17 organic pesticides and five industrial chemicals. Model utilized glass aquaria containing sand, water, Sorghm halpense, caterpillar larvae (Estigmene acrea), snails (Physa sp.), Daphnia magna, green filamentous algae (Oedogonium cardiacum), mosquito larvae, and a mosquito fish (Gambusia affinis). It was found that most chemicals, except the soil insecticide dieldrin, underwent extensive degradation. Dieldrin was found in every organism in the ecosystem, ranging from 0.495 ppm to 230 ppm (the higher figure in the snail). Dieldrin clearly is not metabolized to polar, water-soluble molecules by the organisms, nor is it degraded by chemical or physical processes. Investigation of the phthalate plasticizer, DOP, demonstrated substantial accumulation in the fish and snail. Three polychlorinated biphenyls (PCB's) accumulated in increasing amounts in the fish and snail as the number of chlorine substitutents was increased. Tables presented for each pesticide show concentrations in the organisms and water of model ecosystem. Insecticides tested were: Bux, Sevin, carbofuran, dieldrin, Lindane, Aroclor 5460, Orthene, Parathion. Herbicides were: alachlor, propachlor, Bladex, Bentazon, dicamba, 2,4-D, pyrazon, Trifluralin. The miticide Banomite, fungicide captan, and bacteriostat hexachoorophene were tested, as well as PCB's and phthalate ester plasticizers. (Lynch-Wisconsin)

W78-00231

BASIC DATA AND ANALYSES: SELECTED ASPECTS OF GREAT LAKES ENFORCEMENT.
Enviro Control, Inc., Rockville , Md.
For primary bibliographic entry see Field 5G.
W78-00232

A COMPARATIVE SURVEY OF PETROLEUM HYDROCARBONS IN LAKE SEDIMENTS,
Washington Univ., Seattle. Dept. of Chemistry; and Washington Univ., Seattle. Dept. of Oceanography.
S. G. Wakeham.
Marine Pollution Bulletin, Vol. 7, No. 11, p. 206-210, November, 1976. 4 fig, 20 ref. ERDA E45-12225TA40.

Descriptors: *Lake sediments, *Organic compounds, *Oil pollution, *Urbanization, *Washington, Gas chromatography, Radioactivity techniques, Water pollution sources, *Path of pollutants, Pollutant identification.
Identifiers: Lake Washington(Wash), Lake Sammamish(Wash), Lake Quinault(Wash).

Hydrocarbon distributions in sediment cores from Lake Washington, Lake Sammamish, and Lake Quinault, Washington are studied in relation to urbanization in the surrounding area. The total aliphatic hydrocarbon concentrations in the three sediment cores were plotted as depth profiles and ages were determined at selected depths in the cores using Pb 210 dating. The sediment of Lake Quinault contain relatively-uniform hydrocarbon concentrations of 10-25 micrograms/g throughout the sediment column. The sediments of Lake Washington deeper than 30 cm are similar to those of Lake Quinault (micrograms/g 30), while the surface sediments contain up to about 1500 micrograms/g. Lake Sammamish has surface sediment values of 500 micrograms/g and 100 micrograms/g at depth in the sediment. Gas chromatograms show that those lake sediments with low hydrocarbon concentrations (less or equal to 100 micrograms/g) have hydrocarbons indicative of water which lacks petroleum contamination. Chromatograms of surface sediments from Lake Washington and Lake Sammamish indicate that they do have considerable petroleum contamination, although there is a slight input of hydrocarbons from terrestrial material. (Spaeth-Wisconsin)
W78-00233

POTAMOLOGICAL STUDIES ON THE RIVER INA OF THE RIVER SYSTEM OF YODO: II, (IN JAPANESE),
Osaka Kyoiku Univ. (Japan). Oceanography Lab.
M. Kobayashi, and A. Nakamura.
Mem Osaka Kyoiku Univ Nat Sci Appl Sci 22, p 85-102, 1973.

Descriptors: *Potamology, Rivers, Oxygen, Hydrogen ion concentration, *Water temperature, Water quality, Alkalinity, Chemical oxygen demand, Ions, *Pollutant identification, Water pollution sources.
Identifiers: Japan(River Ina).

The variations of water temperature and the quality of river water measured hourly for 24 h in Aug. 2-3, 1972, at the confluence near the Golf Bridge of the River Ina (Japan) were compared with those of Sept. 1-2, 1970 and Aug. 26-27, 1971, at the same place. The value of pH is comparatively large and changes with water temperature; the variation of Cl- is relatively small; and 4.3 alkalinity and Ca2+ change little. The average for 24 h may be accurately expressed by 7 -h means for 4.3 alkalinity and Ca2+, and approximately for pH. When the daily discharge is relatively large, the time-variatons of Cl- and COD (chemical O2 demand) concentrations are low; but with a smaller flow the fluctuations of Cl- is large and that of COD is roughly parallel to the variation in turbidity. Comparisons among the values of some water qualities suggest that each value of 4.3 alkalinity, Cl- and Ca2+ is correlated to the discharge at the time, and the value of COD gradually decreases from June-Feb. and increases from March-April. (See also W75-06701)--Copyright 1976, Biological Abstracts, Inc.
W78-00234

A CARBON FLOW MODEL OF EPIPELIC ALGAL PRODUCTIVITY IN ALASKAN TUNDRA PONDS,
North Carolina State Univ. at Raleigh. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W78-00235

SOME CHARACTERISTICS OF HYDRILLA TUBERS TAKEN FROM LAKE OCKLAWAHA DURING DRAWDOWN,
Florida Univ., Gainesville. Dept. of Agronomy.
For primary bibliographic entry see Field 5G.
W78-00248

DISSIPATION OF RESIDUES OF 2,4-D IN WATER, HYDROSOIL, AND FISH,
Fish and Wildlife, Warm Springs, GA. Fish Pesticide Research Lab.
For primary bibliographic entry see Field 5G.
W78-00251

THE DRIFT OF AQUATIC AND TERRESTRIAL INVERTEBRATES IN A STREAM OF MASSIF CENTRAL: THE COUZE PAVIN, (IN FRENCH),
Station d'Hydrobiologie Continentale, Biarritz (France). Lab. of Ecology and Invertebrate.
A. Neveu, and M. Echaubard.
Ann Hydrobiol 6(1), p 1-26, 1975.

Descriptors: *Aquatic drift. *Invertebrates, *Copepods, *Diptera, Streams, Biomass, Larvae.
Identifiers: Baetis, *Ephemerella, Hydracarian, Massif-central, Plecoptera, Stenophyllax, *Trichoptera, *France(Couze Pavin).

In the Couze Pavin (France) the summer surface drift represents 32-50% of the drifting organisms, the terrestrial fauna being relatively constant and near 25%. Diptera represent 37-75. 75.5% of the individuals from aquatic drift but only 12.6-27% of the biomass; Trichoptera represent only 1.5-9.5% in number but 24.7-43.7% in biomass. In number Diptera represent from 25.8-55.2% of the surface drift and 35.7-42.2% of the biomass. The drift is nocturnal for Ephemeroptera larvae (Baetis, Ephemerella), Plecoptera (Nemouridae) and Diptera (Simuliidae). It is diurnal for Trichoptera (Limnephildae, Stenophyllax). It is bimodal, diurnal and nocturnal for Coleoptera Elminithidae (Elmis), Diptera (Chironomidae), hydracarians. A full moon has a very clear depressive effect on drift intensity for aquatic larvae. Swelling of waters, however small, has a disturbing effect on the rhythms. Lakes pour a fair amount of zooplankton into the stream. The drift of Copepoda is nocturnal in relation to their vertical migrations.--Copyright 1976, Biological Abstracts, Inc.
W78-00252

AN ECOLOGICAL STUDY OF THE SWANPOOL, FALMOUTH: II. HYDROGRAPHY AND ITS RELATION TO ANIMAL DISTRIBUTIONS,
Bristol Univ. (England). Dept. of Zoology.
A. E. Dorey, C. Little, and R. S. K. Barnes.
Estuarine Coastal Mar Sci. 1(2), p 153-176, 1973.

Descriptors: Ecology, *Ecological distribution, *Hydrography, Hydrogen ion concentration, Brackish water, Ponds, Sea water, *Chlorine, Halocline, Seasonal.
Identifiers: England, Eucrangonyx, Falmouth, Plumatella, Procerodes, Swanpool, Victorella.

Swanpool at Falmouth, Cornwall (England) has a mean depth of 1.6 m and contains about 80,000 m3 of brackish water. It is estimated that in 1 yr 20-30 times this volume of fresh water and about 2 pool-volumes of sea water enter the pool. The freshwater flow is continuous, while the sea water enters only near high water of spring tides. The pool is about 5.05 m above chart datum as compared with the mean high water neap level of 4.2 m and the mean high water spring level of 5.3 m. Consequently the smaller spring tides in midsummer, and even some in midwinter, contribute little or no sea water to the pool, which may become unusually dilute at these times. A well-defined halocline normally persists throughout the year. In summer the hypolimnion is anoxic and its pH is near 7, while the less saline upper layers are saturated with O2 and their pH is frequently as high as 9. There are only small variations of temperature with depth, but in summer the pool temperature is often higher than the temperature of the inflowing fresh water by 5 C. The factors governing surface-average chlorinity, fluctuations of chlorinity and the elimination of chloride from the pool are discussed. So long as the pool is stratified, wind speeds would appear to be as important as rainfall in determining the surface chlorinities and the rate of loss of chloride back to the sea. The distribution of some animals (such as Procerodes, Victorella and Eucrangonyx) are shown to be related to the salinity system in ways that strongly suggest a causal relationship, but for others (such as Gammarus chevreuxi and Plumatella) it is less easy to formulate plausible explanations at this stage. The pool is briefly compared with similar brackish lagoons elsewhere and its place in existing classifications of brackish waters is discussed. (See also W72-05466)--Copyright 1974, Biological Abstracts, Inc.
W78-00258

HIGHWAY ICE AND SNOW REMOVAL AND DEICING SALT PROBLEMS AT LAKE TAHOE,
California State Dept. of Transportation, Sacramento.
D. Foster.
In: Proceedings: Lake Tahoe Research Seminar III, January 17, 1975, p. 3-27. 2 tab. NSF-RA-G'75-001, NSF ISR73-09293-A02.

Descriptors: *Snow removal, *Highway icing, *Highways, *Environmental effects, Surface runoff, Ice, Water quality control, Water pollution sources, Salts, Roads, California, Nevada, Pollutants, Water pollution, Soil contamination.
Identifiers: *Lake Tahoe Basin(Cal-Nev).

Problems associated with environmental effects caused by use of salt for highway snow and ice removal are discussed in regard to the Lake Tahoe Basin. Loss of vegetation along roadsides, and water pollution from highway runoff are possible dangers, together with corrosion of steel and deterioration of concrete on bridge supports and decks. Routine use of salt in California which did not begin until 1962-63, rose to 22,000 tons in 1969. In Caltrans District 3 costs in 1973-74 were $212,000, down from $339,546 the previous winter. Since 1962 the Division of Highways has had a 'bare pavement' policy. Alternative methods of snow and ice control have been tried or considered, including abrasives, vacuum equipment, chains, serrated packed snow, and chemicals other than salt. Abrasives, including sand and gravel, can lead to siltation. Chains have drawbacks, such as inconvenience, pavement and tire wear, and driver over-confidence. Seventeen compounds were tested as salt replacements; two were considered promising--Tetrapotassium-pyrophosphate and Urea--both are potential environmental hazards. (See also W78-00260) (Lynch-Wisconsin)
W78-00261

FAUNAL DISTRIBUTIONS IN SOFT SEDIMENTS OF THE SEVERN ESTUARY,
Imperial Coll. of Science and Technology, London (England). Applied Geochemistry Research Group; and Imperial Coll. of Science and Technology, London (England).
C. R. Boyden, and C. Little.
Estuarine Coastal Mar Sci. 1(3), p 203-223, 1973.

Descriptors: Distribution, Sediments, Estuaries, Sewage, Path of pollutants, Water pollution sources.
Identifiers: England, *Severn Estuary.

The pattern of the infauna on particulate shores of the southern coast of the Severn Estuary (England) has been examined. Although mud predominates as the major beach substratum within the Estuary, sand beaches occur in both the lower and upper reaches. Liquid mud is found at l.w. (low water) in the middle reaches. Suitability of substratum is shown to be the most important factor influencing animal distribution. The number of infaunal species found in this survey did not increase markedly towards the mouth, in contrast to the pattern displayed by rocky shore animals. Several species were rare or absent on mud beaches close to the entrance of the River Avon and the possibility that sewage contamination is responsible for this is discussed.--Copyright 1974, Biological Abstracts, Inc.
W78-00272

SOME FACTORS AFFECTING THE DISTRIBUTION OF ESTUARINE ISOPODS (CRUSTACEA),
University Coll. of Swansea (Wales). Dept. of Zoology.
C. E. Harvey, M. B. Jones, and E. Naylor.
Estuarine Coastal Mar Sci. 1(2), p 113-124, 1973.

Descriptors: *Crustaceans, Distribution, *Isopods, *Ecological distribution, Estuaries, Temperature, Salinity, Estuarine environments.
Identifiers: *United Kingdom(Wales).

The ecological distribution of intertidal isopods is described for a large estuary in South Wales (United Kingdom). Experiments on temperature and salinity tolerances and substrate preference permit an evaluation of the factors limiting the distribution of each species. The replacement of species along the estuary relates to differences in their tolerance of various physical conditions.--Copyright 1974, Biological Abstracts, Inc.
W78-00275

DEEPWATER DUMPSITE 106 BATHYMETRY AND BOTTOM MORPHOLOGY,
National Marine Fisheries Service, Narragansett, RI. Atlantic Environmental Group.
For primary bibliographic entry see Field 2L.
W78-00311

PHYTOPLANKTON IN THE VICINITY OF DEEPWATER DUMPSITE 106,
Woods Hole Oceanographic Institution, MA.
For primary bibliographic entry see Field 5C.
W78-00317

DEEPWATER DUMPSITE 106: ZOOPLANKTON STUDIES,
National Marine Fisheries Service, Narragansett, RI. Narragansett Lab.
K. Sherman, D. Busch, and D. Bearse.
In: NOAA Dumpsite Evaluation Report 77-1, Baseline Report of Environmental Conditions in Deepwater Dumpsite 106, Vol 2, Biological Characteristics, p 233-303, June 1977. 15 fig, 18 tab, 15 ref.

Descriptors: *Zooplankton, *Ecology, *Waste disposal, *Environmental effects, *Baseline studies, Bioindicators, Water pollution sources.
Identifiers: *Outer continental shelf, *Ocean dumping.

The relative abundance and distribution of selected groups of zooplankton and the variation in dominant species between summer and winter within the water masses found in the dumpsite area are described. If the kinds and abundances of organisms routinely occurring at the site are identified, experiments can be designed to test the effects of the waste on appropriate, important species. Also, these data provide an information base which can be used for comparison which will attempt to detect environmental effects of ocean dumping. (Sinha - OEIS)
W78-00318

GELATINOUS ZOOPLANKTON AT DEEPWATER DUMPSITE 106,
Woods Hole Oceanographic Institution, MA.
R. Harbison, L. Madin, and V. McAlister.
In: NOAA Dumpsite Evaluation Report 77-1, Baseline Report of Environmental Conditions in Deepwater Dumpsite 106, Vol 2, Biological Characteristics, p 305-307, June 1977. 1 tab.

Descriptors: *Zooplankton, *Water pollution sources, *Waste disposal, *Water pollution effects, *Baseline studies, *Environmental effects, Bioindicators.
Identifiers: *Outer continental shelf, *Ocean dumping, Salpa aspera.

SCUBA collections of macrozooplankton in the DWD-106 area during the two cruises in 1976 represented dissimilar assemblages of animals. There is a considerable difference between the zooplankton assemblages present in the dumpsite during two periods, two months apart. An even greater contrast exists between two cruises and the dumpsite sampling program carried out in July 1975. Salpa aspera was collected in large numbers in 1975, in midwater trawls taken between 0-800 m. No S. aspera were seen on SCUBA dives or any of four ALVIN dives (to a 1000 m maximum depth) made in the site in June 1976. Salpa aspera is a vertical migrator, and dense populations in the DWD 106 area could transport flocculent pollutants by filtering and ingesting them at the surface and releasing them in fecal pellets at greater depths during migration. However, the presence of S. aspera or any other particular species in the dumpsite, is clearly not seasonally consistent, or predictable. Therefore, biological transport or transformation by a specific zooplankton organism cannot realistically be incorporated into a general model of the fate and effects of pollutants at DWD 106. (Sinha - OEIS)
W78-00319

DISTRIBUTION AND ABUNDANCE OF MESOPELAGIC FISHES ON CRUISES 2 AND 3 AT DEEPWATER DUMPSITE 106,
Rhode Island Univ., Kingston. Dept. of Zoology.
W. H. Krueger, R. H. Gibbs, Jr., R. C. Kleckner, A. A. Keller, and M. J. Keene.
In: NOAA Dumpsite Evaluation Report 77-1, Baseline Report of Environmental Conditions in Deepwater Dumpsite 106, Vol 2, Biological Characteristics, p 377-422, June 1977. 7 fig, 21 tab, 10 ref.

Descriptors: *Fish populations, Ecology, *Waste disposal, *Water pollution sources, *Baseline studies, *Environmental effects, Biomass.
Identifiers: *Outer Continental Shelf, *Ocean dumping.

Vertical aspects of distribution and abundance of the midwater fishes taken during July 1975 and February 1976 are reported. Whether or not the effects of pollution become discernible in the DWD-106 area, pollutants are doubtless carried out of the area by water movements and also by vertically migrating fishes and other organisms. Dumping at DWD-106 and other oceanic areas is most likely to result in long-term, perhaps distant accumulative effects, currently too obscure to be detected readily, but slowly affecting oceanic communities. (Sinha-OEIS)
W78-00321

A SUMMARY OF THE INPUT OF INDUSTRIAL WASTE CHEMICALS AT DEEPWATER DUMPSITE 106 DURING 1974 AND 1975,
National Marine Fisheries Service, Narragansett, RI. Atlantic Environmental Group.
J. J. Bisagni, S. W. Congdon, and K. A. Hausknecht.
In: NOAA Dumpsite Evaluation Report 77-1, Baseline Report of Environmental Conditions in Deepwater Dumpsite 106, Vol 3, Contaminent Inputs and Chemical Characteristics - Appendix, p 487-497, June 1977. 6 tab.

Descriptors: *Industrial wastes, *Chemical wastes, *Heavy metals, *Waste disposal, Water pollution effects, Baseline studies, Environmental effects.
Identifiers: *Outer continental shelf, *Ocean dumping.

The input of the major chemical components of the industrial waste materials at DWD 106 during 1974 and 1975 are summarized. Tabulated data show volume and quantity as well as components or constituents dumped. Four firms - duPont, American Cyanimid, Modern Transportation Co. and Chevron accounted for the industrial waste input at the site in 1974 and 1975. (Sinha - OEIS)
W78-00327

RESULTS OF STUDIES ON THE DISTRIBUTION OF SOME TRANSITION AND HEAVY METALS AT DEEPWATER DUMPSITE 106,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
K. A. Hausknecht.
In: NOAA Dumpsite Evaluation Report 77-1, Baseline Report of Environmental Conditions in Deepwater Dumpsite 106, Vol 3, Contaminent Inputs and Chemical Characteristics - Appendix, p 499-541, June 1977. 16 fig, 12 tab, 45 ref.

Descriptors: *Waste disposal, *Industrial wastes, *Heavy metals, *Baseline studies, *Environmental effects, Water pollution, Delaware, Cadmium, Zinc, Copper, Manganese, Lead, Mercury.
Identifiers: *Outer continental shelf, *Ocean dumping, Pollution surveys, New York Bight.

The waste materials discharged at DWD 106 contain transition and heavy metals in concentrations that are several orders of magnitude higher than ambient levels in the water column. Since the introduction of these wastes into the ocean may result in potentially harmful changes in the concentrations or chemical speciation of toxic metals, water samples have been analyzed on two of the three characterization cruises conducted at DWD 106 to provide data on the ambient background levels of some of these metals in that region. This paper reports the distribution of zinc, mercury, cadmium, copper, lead, and manganese at DWD 106 based on data collected by R/V ALBATROSS IV in May 1974 and FRS OREGON II in February 1976. (Sinha - OEIS)
W78-00328

FINAL REPORT ON HEAVY METALS IN SMALL PELAGIC FINFISH, EUPHAUSID CRUSTACEANS AND APEX PREDATORS, INCLUDING SHARKS, AS WELL AS ON HEAVY METALS AND HYDROCARBONS (C15+) IN SEDIMENTS COLLECTED AT STATIONS IN AND NEAR DWD 106,
National Marine Fisheries Service, Milford, CT. Middle Atlantic Coastal Fisheries Center.
R. Greig, and D. Wenzloff.

In: NOAA Dumpsite Evaluation Report 77-1, Baseline Report of Environmental Conditions in Deepwater Dumpsite 106, Vol 3, Contaminent Inputs and Chemical Characteristics - Appendix, p 547-564, June 1977. 1 fig, 4 tab, 8 ref.

Descriptors: *Waste disposal, *Baseline studies, *Environmental effects, *Water pollution, *Heavy metals, *Oil pollution, Industrial wastes, Crustaceans.
Identifiers: *Outer continental shelf, *Ocean dumping, Pelagic fish, Hydrocarbons, Finfish, Predators, New York Bight.

During a cruise (18 February - 3 March, 1976) of the FRV OREGON II to the deepwater industrial waste site designated as DWD 106, trawl and bongo net samples were collected to obtain small pelagic finfish and euphausid crustaceans. The resulting heavy metal data are provided in this report and are compared with similar data which resulted from earlier collections made in and near the DWD 106 and on the continental shelf of the New York Bight. Heavy metal values in deepwater sediments collected in 1976 were generally similar to those reported for collections made in 1974. Concentrations of metals in sediment from stations on the shelf in less than 200 m of water were similar to those collected from shelf stations in 1974. The amounts of C15+ hydrocarbons in sediments from DWD 106 are much less than those found in sediments at other dumpsites located in relatively shallow coastal waters. (Sinha - OEIS)
W78-00330

APPENDIX, (NOAA DUMPSITE EVALUATION REPORT),
National Marine Fisheries Service, Washington, DC. National Systematics Lab.
For primary bibliographic entry see Field 5E.
W78-00331

ATMOSPHERIC VANADIUM TRANSPORT TO THE OCEAN,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
R. A. Duce, and G. L. Hoffman.
Atmospheric Environment, Vol. 10, No. 11, 1976. p 989-996, 2 fig, 7 tab, 34 ref.

Descriptors: *Water pollution sources, *Environmental effects, *Vanadium, Atmosphere, Transportation, *Oceans, Model studies, *Path of pollutants, *Air pollution.
Identifiers: Atmospheric transport(Vanadium).

Evaluation of data shows most of the vanadium present in the northern hemisphere westerlies over the Atlantic and Pacific Oceans to be from anthropogenic sources. There have been no direct measurements of the flux of atmospheric vanadium to the ocean surface but model estimates indicate that approximately 10% of the anthropogenic atmospheric vanadium produced in continental areas is deposited in open ocean regions. It is suggested that this element may serve as a valuable tracer in theoretical and experimental models designed to evaluate transport of atmospheric pollutants to the open ocean. (Chilton-ORNL)
W78-00336

ZOOPLANKTON OF BACINSKA LAKES: A CONTRIBUTION TO THE KARSTIC LIMNOLOGY, (IN SERBO-CROATIAN),
Bioloski Inst., Belgrade (Yugoslavia).
For primary bibliographic entry see Field 2H.
W78-00340

DISSOLVED AND PARTICULATE TRACE METALS IN THE RHINE ESTUARY AND THE SOUTHERN BIGHT,
Nederlands Inst. voor Onderzoek der Zee, Texel.
J. O. Duinker, and R. F. Nolting.
Marine Pollution Bulletin, Vol. 8, No. 3, March 1977. p 65-71, 9 fig, 1 tab, 17 ref.

Descriptors: Environmental effects, *Water pollution sources, *Trace elements, Copper, Zinc, Iron, Manganese, Aluminum, Estuaries, Sedimentation, Chemical precipitation, *Metals.
Identifiers: Mobilization processes, *Rhine estuary, *Southern Bight.

The purpose of measurement of dissolved and particulate trace metals was to study the relative importance of precipitation and sedimentation processes as compared to mobilization processes in the estuary and their impact on trace metal levels in the Southern Bight. Distribution of the amounts of leacheable trace metals in the bight was similar to the distribution of suspended matter. Offshore stations had minimum values of copper, iron, manganese, zinc and aluminum with these values increasing towards the coast. Particulate metal concentrations were distributed in a more complex way. Copper and zinc distributions were similar as were those of iron, manganese and aluminum. Observations showed that the Rhine estuary acts as a sink for trace metals including dissolved species. This conclusion does not support the mobilization theory. Results indicate that pollution of the Southern Bight by a number of river-borne trace metals at the moment is primarily a coastal problem. (Chilton-ORNL)
W78-00344

QUALITY OF EFFLUENTS FROM VARIOUS MECHANICAL PULPING PROCESSES,
Pulp and Paper Research Inst. of Canada, Pointe Claire (Quebec).
A. Wong.
Canadian Pulp and Paper Association, Annual Meeting (Montreal), 1976, Preprints, p 163-168A. 3 fig, 33 ref, 6 tab.

Descriptors: *Pulp wastes, *Water quality, Effluents, Wastes, Industrial wastes, Water pollution sources, Biochemical oxygen demand, Toxicity, Pulp and paper industry, Treatment facilities.
Identifiers: *Mechanical pulping, Newsprint mills, Groundwood mills, Refiner groundwood mills, *Thermomechanical pulp mills.

Many newsprint mills are presently considering the replacement of their stone groundwood or refiner groundwood pulping process with a thermomechanical pulping (TMP) process. Aside from the obvious economic considerations, the environmental impact of such changes may need to be considered carefully also. At present, there is only limited information available on the comparative qualities of conventional mechanical pulping and TMP effluents. Present evidence indicates that TMP effluents may contain more BOD and toxic substances than conventional mechanical pulping effluents. (Witt-IPC)
W78-00368

SOME PHYSICAL, CHEMICAL, AND MICROBIOLOGICAL CHARACTERISTICS OF TWO BEACHES OF ANGLESEY,
University Coll. of North Wales, Bangor. Dept. of Marine Biology.
K. B. Pugh, A. R. Andrews, C. F. Gibbs, S. J. Davis, and G. D. Floodgate.
J Exp Mar Biol Ecol. 15(3), p 305-334, 1974.

Descriptors: *Bacteria, *Microbiology, *Beaches, Sands, *Nitrates, *Nitrogen, Chemical properties, Physical properties, Sand dunes, Waves.
Identifiers: Anglesey, *United Kingdom(Wales).

Observations during 1971 and 1972 of some of the physical, chemical and microbiological characteristics of contrasting Anglesey beaches, Newborough and Llanddona (United Kingdom), are reported. The fine sandy beach at Newborough was very unstable and topographical changes were recorded. In particular, the movement of a sand wave across the intertidal zone from low water to extinction at the foot of the dune system was observed. The more extensive fine sandy beach at Llanddona had greater stability. Chemically, each beach was variable both spatially and temporally, with ill-defined patterns of concentration changes. Sand from Newborough beach was low in organic C (0.07-0.40 mg C/g dry sand) and well aerated, and the soluble inorganic N in the ground water (up to 30 micrograms-at. N/l) was dominated by nitrate form (up to 22 micrograms NO3-N/l). By contrast, Llanddona sand had a more variable organic C content (0.22-2.25 mg C/g dry sand), was wetter, and poorly aerated with consequent sulphide lenses; its dissolved inorganic N (over 70 microgram-at. N/l) was completely dominated by the ammonium form. Microbiologically, the beaches possessed dissimilar bacterial floras, and sediment from Llanddona gave higher bacterial counts than that from Newborough. For both beaches estimated bacterial numbers decreased with depth as well as down the intertidal zone.--Copyright 1975, Biological Abstracts, Inc.
W78-00375

CHARACTERIZING EFFLUENT VARIABILITY FROM PAPER INDUSTRY WASTEWATER TREATMENT PROCESSES EMPLOYING BIOLOGICAL OXIDATION,
Tufts Univ., Medford, MA.
J. J. McKeown, and I. Gellman.
Progress in Water Technology, Vol 8, No 1, p 147-163, 1976. 12 fig, 1 ref, 6 tab.

Descriptors: *Pulp wastes, Discharge(Water), *Waste water treatment, *Biological treatment, Effluents, Pulp and paper industry, Wastes, Suspended solids, Biochemical oxygen demand, Activated sludge, Aerated lagoons, *Oxidation lagoons, Waste water(Pollution), *Oxidation.
Identifiers: Groundwood mills, Sulfite pulp mills, Kraft mills, Deinking mills, *Biological oxidation.

The variability existing in final effluents discharged from the pulp and paper industry is reviewed for several integrated mills with different pulping operations, including groundwood, sulfite, bleached kraft, and waste paper deinking mills. Effluent treatment systems associated with these manufacturing operations include activated sludge, aeration stabilization systems (single- and two-stage) with post-storage following several of the biological oxidation systems. Suspended solids and BOD (lb/day) are examined for frequency distribution, coefficient of variation, autocorrelation, and power spectrum. With few exceptions, effluent BOD and suspended solids frequencies are more centrally distributed using the logarithm of the data. Variations in the annual averages of BOD and suspended solids show wide ranges, indicating major differences in the manufacturing process and/or treatment systems. Insight into the trends and frequencies which exist in the effluent data was obtained from a time series analysis. (Swichtenberg-IPC)
W78-00378

HEAVY METALS IN THE DERWENT ESTUARY,
Tasmania Univ., Hobart. Dept. of Chemistry.
H. Bloom, and G. M. Ayling.
Environmental Geology, Vol 2, p 3-22, 1977. 12 fig, 15 tab, 73 ref.

Descriptors: *Heavy metals, Metals, Distribution, *Estuaries, *Cadmium, *Chromium, *Cobalt, *Copper, *Iron, *Lead, *Mercury, Manganese, Estuarine environment, Path of pollutants, Nickle, Zinc, Absorption, Bioindicators, Shrimp, Water pollution sources, Invertebrates, Toxicity, Sediments, Australia.
Identifiers: *Barnacles, Bioaccumulation, Tissue analysis, Tasmania, *Derwent Estuary(Tasmania).

Analyses of the concentrations of Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, and Zn in filtered waters,

suspended particulates, sediments, shellfish, fish, airborne particulates, and sewage confirmed that the Derwent Estuary was heavily contaminated, particularly with mercury, cadmium, lead, and zinc. Apparently most of the contamination originated from the earlier operation of a zinc refining plant. A study of shellfish growing in variously contaminated regions found that more than 20 species could be listed in order of their respective abilities to accumulate each heavy metal. The mussel was found to be a good indicator of cadmium and mercury contamination, but less valuable as an indicator of zinc. The surf barnacle was found to be one of the most sensitive biological indicators of cadmium contamination. (Klein)
W78-00393

HYDROCARBON BUDGETS FOR LAKE WASHINGTON,
Washington Univ., Seattle. Dept. of Chemistry; and Washington Univ., Seattle. Dept. of Oceanography.
S. G. Wakeham.
Limnology and Oceanography, Vol 22, No 5, p 952-957, 1977. 1 fig, 2 tab, 18 ref.

Descriptors: *Path of pollutants, *Organic compounds, Runoff, *Urban runoff, *Water pollution sources, Lakes, *Oil, Fuels, Oil pollution, Oil wastes, Rivers, *Sedimentation, *Washington.
Identifiers: *Lake Washington(Wash), *Hydrocarbon budget.

Fluxes of hydrocarbons through Lake Washington showed that urban stormwater runoff and river runoff were the major sources of petroleum hydrocarbons to the lake. Sedimentation was the primary removal process for these hydrocarbons. (Klein)
W78-00394

BIOLOGICAL TRANSPORT OF ZINC-65 INTO THE DEEP SEA,
Oregon State Univ., Corvallis. School of Oceanography.
W. G. Pearcy, E. E. Krygier, and N. H. Cutshall.
Limnology and Oceanography, Vol 22, No 5, p 846-855, 1977. 2 fig, 4 tab, 35 ref.

Descriptors: *Metals, *Zinc, *Path of pollutants, *Translocation, *Radioisotopes, Benthos, Movement, Mode of action, Water conveyance, Vertical migration, Food chains, Biological communities, Benthic fauna, Sampling.
Identifiers: *Biological transport, Pelagic fauna.

The specific activities of zinc-65 (65Zn:Zn) in pelagic and benthic animals collected off Oregon were correlated with depth of capture to estimate vertical biological transport rates. Results suggested that about 2 yr were required for transport of 65Zn from near-surface to abyssobenthic animals. Vertical transport appeared to be slower in upper waters, suggesting recycling of zinc within biological communities, and more rapid below 500 m. The long vertical transport time for zinc constrasted with the shorter times estimated for transport of zinc and other elements by fecal pellets. This raised questions about the importance of fecal pellets as a rapid transport mechanism for biologically required materials into the deep sea. (Klein)
W78-00395

MERCURY LEVELS IN BIOTA FROM MORRUM RIVER DURING A 10 YEAR CLEAN-UP PERIOD,
Naturhistoriska Riksmuseet, Stockholm (Sweden). Section for Invertebrate Zoology.
M. Olsson.
Institute of Freshwater Research, Drottningholm No. 52, p 71-90, 1977. 4 tab, 15 fig, 30 ref.

Descriptors: *Mercury, Rivers, *Metals, *Distribution, *Biota, Water pollution sources, Invertebrates, Fish, Absorption, Metabolism, Pulp wastes, Water quality, Sampling, Water quality control, Quality control, Path of pollutants.
Identifiers: Bioaccumulation, *Morrum River(Sweden).

No correlation was found between mercury levels and the food or choice of habitat of the different species. The ratios between the mercury levels found in 8 different species were the same in uncontaminated as in contaminated areas. The levels found in invertebrates seemed to depend mainly on intake from the water and possibly also on the metabolic rate of the organism. For the main part of the material collected downstream from the paper-mill the decrease in the mercury concentration with time seemed to be exponential. During the discharge period the highest levels occurred close to the paper-mill on the downstream side. After the discharge had ceased the highest levels were found lower down the river. The geographical change in the concentration maximum was probably due to the fact that the source of pollution became the sediments instead of the paper-mill and that water further down the river has passed over a larger area of the sediments. The decrease in mercury levels was rapid in fish. (Klein)
W78-00397

DISTRIBUTION AND TEMPERATURE ADAPTATION IN THE TELEOST FISH GENUS GIBBONSIA,
San Francisco State Univ., CA. Dept. of Biology.
B. J. Davis.
Marine Biology, Vol. 42, p 315-320, 1977. 3 fig, 4 tab, 18 ref.

Descriptors: *Coasts, *Teleosts, *Sampling, *Temperature, *Distribution, *Intertidal areas, *Thermal stress, Shores, Seasonal, California, Resistance. Speciation, Adaptation, Mode of action, Environmental gradient.
Identifiers: *Gibbonsia, Environmental ecology.

Along the California coast there exist three intertidal species of the genus Gibbonsia (G. elegans, G. metzi, G. montereyensis). These species had distinct but overlapping distributions. Collections were made seasonally from three areas. Each collection was divided into two groups - a critical thermal maximum and minimum were determined for one group and the other group was tested after a 3 week acclimation period. The three species showed genetically different adaptation abilities and these were correlated with species differences in latitudinal distributions. The species that experiences the widest seasonal temperature range proved capable of anticipatory adjustment to temperature while the two experiencing small seasonal changes showed only reactive adjustments. The species with the widest distribution showed the greatest ability to adapt to temperature extremes. After 1 week acclimation all three species demonstrated different mechanisms for heat and cold adaptation. (Klein)
W78-00399

EFFECTS AND UPTAKE OF CHLORINATED NAPHTHALENES IN MARINE UNICELLULAR ALGAE,
Environmental Research Lab., Gulf Breeze, FL.
For primary bibliographic entry see Field 5C.
W78-00403

CONCENTRATION OF CADMIUM, COPPER, LEAD, AND ZINC IN THIRTY-FIVE GENERA OF FRESHWATER MACROINVERTEBRATES FROM THE FOX RIVER, ILLINOIS AND WISCONSIN,
Northern Illinois Univ., DeKalb. Dept. of Biological Sciences.
R. V. Anderson.
Bulletin of Environmental Contamination and Toxicology, Vol 18, No. 3, p 345-349, 1977. 1 tab, 6 ref.

Descriptors: *Speciation, *Distribution, *Metals, Invertebrates, *Crustaceans, *Copper, *Cadmium, *Zinc, *Lead, Path of pollutants, Freshwater, Food chains, Ecosystems, Analytical techniques, Aquatic life, Trophic level, Rivers, Sampling, Illinois, Wisconsin.
Identifiers: Bioaccumulation, Tissue analysis, Fox River(Ill-Wis).

The general relationship for 35 genera of aquatic invertebrates from the Fox River was Cd<Cu<Pb<Zn, except in crustaceans where Cd<Pb<Cu<Zn. Large variations in values among the taxa studied was, in part, a function of the sampling locations as well as the trophic position of a particular taxa within a food chain. (Klein)
W78-00404

PARALYTIC SHELLFISH POISONING IN TENAKEE, SOUTHEASTERN ALASKA: A POSSIBLE CAUSE,
National Marine Fisheries Service, Auke Bay, AK. Auke Bay Lab.
For primary bibliographic entry see Field 5C.
W78-00406

WATER QUALITY CRITERIA RESEARCH OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY, PROCEEDINGS OF AN EPA SPONSORED SYMPOSIUM ON MARINE, ESTUARINE AND FRESHWATER QUALITY, PRESENTED AT THE 26TH ANNUAL MEETING OF THE AIBS, AUGUST 1975.
Corvallis Environmental Research Lab., OR.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 091, Price codes: A09 in paper copy, A01 in microfiche. Ecological Research Series, Report EPA 600/3-76-079, 207 p, 1976, 81 fig, 38 tab, 221 ref.

Descriptors: *Water quality standards, *Publications, *Research and development, Model studies, Mathematical models, Chlorine, Ecosystems, Toxins, Freshwater, Marine biology, Toxicity, Estuaries, Lakes, Phosphorus, Nitrogen, Laboratory tests, Trace metals. Bioassay, Biological communities, Productivity, Water pollution sources.
Identifiers: *Water quality criteria(Environmental Protection Agency).

The proceedings included a cross-sectional representation of the broad base ecological effects research programs conducted by research laboratories of the EPA Office of Health and Ecological Effects. The presentations focused on microbial and abiotic degradation processes, the problem of trace metals, the effects of toxic organics, and the feasibility of new-stress-measuring methodologies in the marine environment. The freshwater segment of the symposium addressed the transport and biological modeling capabilities of the laboratories, cold climate aquatic biology, lake trophic states in the eastern United States, and the impact of toxic substances on freshwater systems. (See W78-00409 thru W78-00421) (Klein)
W78-00408

STRUCTURAL ANALYSIS OF STRESSED MARINE COMMUNITIES,
Corvallis Environmental Research Lab., OR.
For primary bibliographic entry see Field 5C.
W78-00409

TRACE METALS IN THE OCEANS: PROBLEM OR NO,
Environmental Research Lab., Narragansett, RI.
E. W. Davey.
In: Water Quality Criteria of the U.S. Environmental Protection Agency, Report EPA-600/3-76-079, p 13-22, 1976. 1 fig, 3 tab, 7 ref.

Descriptors: *Metals, *Toxicity, *Oceans, *Trace elements, *Elements(Chemical), Water pollution sources, Wastes, Bioassay, Water quality, Analytical techniques, Sampling, Path of pollutants, Inorganic chemicals, Environmental effects, Cadmium, Copper, Mercury, Zinc.
Identifiers: *Bioaccumulation.

A metals matrix indicated that information exists in only 36 elements and of these only 18 have toxicity data listed and of the 18 only four (Cd, Cu, Hg, and Zn) were significantly documented in terms of toxicity and bioaccumulation. A program was developed for acute and chronic marine bioassay information on a wide spectrum of elements. On the basis of known human toxicity, information indicating elemental impact in the marine environment and the form of the element in seawater, 50 elements were to be chosen for short-term, acute bioassays. Metal pollution sources were discussed. (See also W78-00408) (Klein)
W78-00410

PERSISTENCE IN MARINE SYSTEMS,
Environmental Research Lab., Narragansett, RI.
K. T. Perez.
In: Water Quality Criteria Research of the U.S. Environmental Protection Agency, Proceedings, Report EPA-600/3-76-079, p 23-30, 1976. 3 fig, 2 tab, 10 ref.

Descriptors: *Benthos, *Biological communities, *Model studies, *Sampling, *Persistence, *Toxicity, *Systems analysis, *Simulation analysis, Bioassay, Path of pollutants, Water pollution sources, Environmental effects, Aquatic life, Methodology.
Identifiers: Laboratory microcosms.

A strategy for establishing limits for the consequences of changes in total systems caused by various disturbances was developed. Systems were viewed as holistic; laboratory marine microcosms were established; and persistence limits of a system were defined. (See also W78-00408) (Klein)
W78-00411

CRITERIA FOR MARINE MICROBIOTA,
Environmental Research Lab., Narragansett, RI.
V. J. Cabelli, A. P. Dufour, M. A. Levin, and P. W. Haberman.
In: Water Quality Criteria Research of the U.S. Environmental Protection Agency, Proceedings, Report EPA-600/3-76-079, p 31-45, 1976. 5 fig, 6 tab, 18 ref.

Descriptors: *Biota, *Beaches, *Bioindicators, *E. coli, *Sewage bacteria, *Bacteria, *Animal physiology, *Water quality standards, Metabolism, Productivity, Coliforms, Pathogenic bacteria, Recreation facilities, Population, Microorganisms, Water pollution effects, Environmental effects, Public health.
Identifiers: *Klebsiella, *Aeromonas hydrophila, Human physiology.

Estuarine and coastal waters as microbial indicators were examined in assessing the ecological and human health impact of industrial, agricultural and sanitary pollutants but were found to not yet have been adequately quantified. Pollution associated effects on human health were found to be more amenable to quantification for guidelines and standards for water. A long-term epidemiological-microbiological program was developed and confirmed a close relationship of GI symptomology of swimmers at New York City beaches to E. coli, Klebsiella, and Aeromonas hydrophila densities. (See also W78-00408) (Klein)
W78-00412

IMPACT OF CHLORINATION PROCESSES ON MARINE ECOSYSTEMS,
Environmental Research Lab., Gulf Breeze, FL.; and Environmental Research Lab., Johns Island, SC. Bears Bluff Field Station.
For primary bibliographic entry see Field 5C.
W78-00413

TECHNIQUES TO ASSESS THE EFFECTS OF TOXIC ORGANICS ON MARINE ORGANISMS,
Environmental Research Lab., Gulf Breeze, FL.
For primary bibliographic entry see Field 5C.
W78-00414

THE EFFECT OF SUBTLE TEMPERATURE CHANGES ON INDIVIDUAL SPECIES AND COMMUNITY DIVERSITY,
Environmental Research Lab., Narragansett, RI.
For primary bibliographic entry see Field 5C.
W78-00415

MODELS FOR TRANSPORT AND TRANSFORMATION OF MALATHION IN AQUATIC SYSTEMS,
Environmental Research Lab., Athens, GA.
J. W. Falco, D. L. Brockway, K. C. Sampson, H. P. Kollig, and J. R. Maudsley.
In: Water Quality Criteria Research of the U.S. Environmental Protection Agency, Proceedings, Report EPA-600/3-76-079, p 97-113, 1976. 9 fig, 4 tab, 11 ref.

Descriptors: *Toxins, Research and development, *Model studies, *Organic compounds, *Organophosphorous compounds, *Mathematical models, Design, Model studies, Laboratory tests, Ecosystems, Simulation analysis, Bacteria, Research equipment, Transfer, Biochemistry, Chemistry, Physical models.
Identifiers: *Malathion.

A mathematical model was developed for predicting the fate and transport of malathion in riverrine aquatic ecosystems. Two competing degradation pathways were modeled-alkaline hydrolysis and microbial breakdown. Incorporating data obtained from previous laboratory studies, the model was used to verify proposed degradation mechanisms by predicting the behavior of malathion in the AEcoS, a physical system designed to simulate environmental conditions as closely as possible. Although in general results were similar for the two systems, rates measured in the environmental simulator were slower than those measured in laboratory studies. (See also W78-00408) (Klein)
W78-00416

SHAGAWA LAKE RECOVERY CHARACTERISTICS AS DEPICTED BY PREDICTIVE MODELING,
Corvallis Environmental Research Lab., OR.
D. P. Larsen, and H. T. Mercier.
In: Water Quality Criteria Research of the U.S. Environmental Protection Agency, Proceedings, Report EPA-600/3-76-079, p 114-137, 1976. 6 fig, 2 tab, 28 ref.

Descriptors: *Model studies, *Lakes, *Phosphorus, Mathematical models, Research and development, Physical models, Biomass, Algae, Water quality, Laboratory tests, Analytical techniques, Effluents, Environmental effects, Inorganic compounds, Ecosystems, Limnology, Water chemistry, *Minnesota, Forecasting.
Identifiers: *Predictive modeling, *Shagawa Lake(Minn).

Predictions obtained using several mass balance models describing changes expected in lake phosphorus concentrations resulting from an external phosphorus supply reduction to Shagawa Lake were compared with observations. Two of the models predicted a rapid recovery of the lake and underestimated present wintertime phosphorus concentrations by about 50%. A third model which includes an algal biomass component projected similar wintertime total phosphorus concentrations but showed how internal sources of phosphorus can delay the attainment of this level. Two of these models were used to project lake phosphorus concentrations expected if wastewater phosphorus concentrations were allowed to increase from the present 50 microg/liter to 400 micro g/liter and 1.0 mg/l. Both suggested that at effluent concentrations of 1.0 mg/l, the lake would exhibit phosphorus concentrations often associated with a eutrophic state. (See also W78-00408) (Klein)
W78-00417

A MATHEMATICAL MODEL OF POLLUTANT CAUSE AND EFFECT IN SAGINAW BAY, LAKE HURON,
Environmental Research Lab.-Duluth, Gross Ile, MI. Large Lakes Research Station.
W. L. Richardson, and V. J. Bierman, Jr.
In: Water Quality Criteria Research of the U.S. Environmental Protection Agency, Proceedings, Report EPA-600/3-76-079, 1976. p 138-158. 17 fig, 2 tab, 9 ref.

Descriptors: *Mathematical models, *Model studies, *Water quality, *Methodology, *Physical models, *Chlorophyll, *Growth rates, *Lake Huron, *Data collections, *Biomass, Distribution, Nutrients, Population, Phytoplankton, Limnology, Research and development.
Identifiers: *Saginaw Bay(Lake Huron).

Field examination of water quality and development of cause and effect models for data interpretation was undertaken in Saginaw Bay. Models were designed to simulate the effect of nutrients on the growth, composition, and distribution of phytoplankton biomass. Methodology, including the practical considerations of applying an existing model, a phytoplankton chlorophyll-nutrient model, was the primary emphasis of the study. The average chlorophyll a biomass model was found to be an economical research tool in analyzing complex limnological interactions and useful in guiding additional research and data gathering activities. (See also W78-00408) (Klein)
W78-00418

MATHEMATICAL MODEL OF PHYTOPLANKTON GROWTH AND CLASS SUCCESSION IN SAGINAW BAY, LAKE HURON,
Environmental Research Lab.-Duluth, Gross Ile, MI. Large Lakes Research Station.
For primary bibliographic entry see Field 5C.
W78-00419

IMPLICATION OF RESOURCE DEVELOPMENT ON THE NORTH SLOPE OF ALASKA WITH REGARD TO WATER QUALITY ON THE SAGAVANIRKTOK RIVER,
Corvallis Environmental Research Lab., College, AK. Arctic Environmental Research Station.
E. W. Schallock.
In: Water Quality Criteria Research of the U.S. Environmental Protection Agency, Proceedings, Report EPA-600/3-76-079, p 174-184, 1976. 3 fig, 1 tab, 20 ref.

Descriptors: Alaska, Industries, *Water quality, Aquatic life, *Environmental effects, *Industrial wastes, Sewage, Water quality, Oil, Water pollution sources, Precipitation(Atmospheric), *Arctic.
Identifiers: *Sagavanirktok River(Alas), *Alaska(North Slope).

The impact of industry on water quality of the Sagavanirktok (Sag) River, located on the North Slope of Alaska, and the ensueing effects on indigenous aquatic biota were investigated. Rapidly expanding industry, drawing on water and gravel, permafrost, and limited water precipitation were impact sources studied. (See also W78-00408) (Klein)

W78-00420

LAKE EUTOPHICATION: RESULTS FROM THE NATIONAL EUTROPHICATION SURVEY,
Corvallis Environmental Research Lab., OR.
For primary bibliographic entry see Field 5C.
W78-00421

MONITORING THE ENVIRONMENT FOR ECOLOGICAL CHANGE,
Washington Univ., Seattle. Dept. of Biostatistics.
G. van Belle, and L. Fisher.
Journal Water Pollution Control Federation, Vol. 49, p. 1671-1679; 5 tab, 12 ref.

Descriptors: *Methodology, *Distribution, *Statistical models, *Statistical methods, *Frequency analysis, Data collections, Data processing, Bays, Sampling, Statistics, Biological communities, Ecosystems, Wisconsin, *Monitoring, *Pollutant identification.
Identifiers: Diversity index, *Green Bay(Wisc).

The statistical aspects of monitoring water systems in time and space for sudden ecological changes were considered. The data consisted of species-frequency lists collected at several sites at one or more times. The major statistical problem with analyzing the lists was the establishment of an appropriate frequency distribution under a suitable hypothesis. The paper employed a permutational approach to generate appropriate frequency distributions. Statistical tests were then developed to test whether biological communities or changes in biological communities were connected with ecological changes some distance removed from these communities. The procedures were illustrated by data from Green Bay, Lake Michigan. (Katz)
W78-00422

AQUATIC INSECTS AS BIOLOGICAL MONITORS OF HEAVY METAL POLLUTION,
Iranian Dept. of the Environment, Tehran.
R. B. Nehring.
Bulletin of Environmental Contamination and Toxicology, Vol. 19, No. 2, p. 147-154, 1976; 1 fig, 7 tab, 12 ref.

Descriptors: *Invertebrates, *Mayflies, *Aquatic insects, *Bioindicators, *Metals, *Heavy metals, *Toxicity, *Stoneflies, *Lead, *Copper, *Zinc, Pollutant identification, Resistance, Path of pollutants, Animal physiology, Bioassay.
Identifiers: Bioaccumulation, Ephemerella grandis, Silver, Pteronarcys californica.

A mayfly, ephemerella grandis, and a stonefly, Pteronarcys californica, were exposed to lead, zinc, copper, and silver to determine the acute metal toxicities. The insects tested were found to be more tolerant of the heavy metals than most fish. They concentrated the metals in relative proportion to the occurrence of the metals in the stream by some predictable, reproducible factor. These data, together with field tests, indicate aquatic insects may serve as effective biological monitors of heavy metal pollution where fish-kills are involved. (Katz)
W78-00426

METALS IN PLANTS AND WATERS IN THE OKEFENOKEE SWAMP AND THEIR RELATIONSHIP TO CONSTITUENTS FOUND IN COAL,
Governors State Univ., Park Forest South, IL. Coll. of Environmental and Applied Sciences.
D. J. Casagrande, and L. D. Erchull.
Geochimica et Cosmochimica Acta, Vol. 41, p 1391-1394, 1977. 2 tab, 10 ref.

Descriptors: *Peat, *Fossil fuels, *Coals, *Metals, *Swamps, Inorganic compounds, Organic compounds, Physiochemical properties, Analytical techniques, Distribution, Plant tissues, Ecosystems, Sampling, Calcium, Chromium, Copper, Iron, Mercury, Potassium, Magnesium, Manganese, Nickel, Lead, Zinc, Barium.
Identifiers: *Okefenokee Swamp, Tissue analysis, Peat-forming system.

The Okefenokee peat-forming systems were viewed as modern progenitors of coal. Plants form an intimate component of each peat-forming system and contribute organic and inorganic constituents to peat which ultimately becomes coal. Fourteen major and minor metals--Ba, Ca, Cr, Cu, Fe, Hg, K, Mg, Mn, Na, Ni, Pb, and Zn--were determined in plants and waters from the swamp and marsh environments. The wide variations in: (1) present source vegetation between the two major environments; (2) past vegetational covers; (3) metal distributions between plants of different genera; (4) metal distributions between different anatomical components of the same species; and (5) importance of anatomical components (i.e. stems vs leaves, etc.) as organic contributors to the peat, all contributed to the erratic metal profiles previously observed in associated peat. Furthermore, the variations in metal distributions in peat-forming systems may contribute to the often wide variations in metal distributions in horizontal and vertical directions in the coal seam. (Klein)
W78-00429

THE DYNAMICS OF BIOLOGICALLY AVAILABLE MERCURY IN A SMALL ESTUARY,
Hawaii Univ., Honolulu. Dept. of Zoology and Water Resources Research Center.
S. N. Luoma.
Estuarine and Coastal Marine Science, Vol. 5, p 643-652, 1977. 8 fig, 2 tab, 12 ref.

Descriptors: *Mercury, *Shrimp, *Estuaries, *Worms, *Metals, Absorption, Runoff, Path of pollutants, Water pollution sources, Laboratory tests, Radioisotopes, Seasonal, *Hawaii, Estuarine environment, Public health.
Identifiers: *Polychaetes, *Bioaccumulation, Tissue analysis, Palaemon debilis, Nereis succinea, *Ala Wai Canal(HI).

Total mercury concentrations in shrimp (Palaemon debilis) and polychaetes (Nereis succinea) from Ala Wai Canal, a small Hawaiian estuary, fluctuated over nearly two orders of magnitude during 1973-1974. A simulation of mercury levels in shrimp from the estuary, based upon a mathematical model of 203Hg-HgC12 exchange in this species, showed that mercury concentrations in P. debilis were never at steady state during the sampling period. Shrimp appeared to rapidly concentrate solute mercury which periodically entered the estuary in storm runoff. Between rainstorms little of the mercury remaining in the estuary (primarily in sediment-bound form) appeared to be available to either the deposit-feeding shrimp or the worm. Because net loss of mercury from both species was slow relative to the rate of uptake, long periods of time were necessary to lose the mercury accumulated during the short rainstorms. (Klein)
W78-00430

POTENTIAL CONTRIBUTION OF ATMOSPHERIC FALLOUT TO THE PHOSPHORUS BUDGET OF COLUMBIA LAKE, CONNECTICUT,
Connecticut Univ., Storrs. Biological Sciences Group.
P. H. Rich, and B. L. Pallotti.
Journal of the Fisheries Research Board of Canada, Vol. 34, No. 5, p 692-697, May 1977. 4 fig, 4 tab, 12 ref. OWRT A-054-CONN(7).

Descriptors: *Fallout, *Phosphorus, *Lakes, *Connecticut, Model studies, Mathematical models, Runoff, Watersheds(Basins), Septic tanks, Fertilizers, Water pollution, Pollutants, Nutrients, Water pollution sources, Urbanization.
Identifiers: *Columbia Lake(Conn).

The Dillon-Rigler Model applied to a heavily 'urbanized' lake in New England predicted that less than one half the total input of total phosphorus enters as stream runoff. Of the remaining predicted input, about two thirds may be entering as atmospheric fallout. The balance is suspected to be septic tank seepage and lawn fertilizer runoff. Lake level management dominates the annual pattern of discharge from the watershed and basin and severely restricts the structure of the upper littoral zone. As a result, there may be an adverse effect upon the accuracy of the Dillon-Rigler Model. (Sims-ISWS)
W78-00438

ACCELERATED SALT TRANSPORT METHOD FOR MANAGING GROUND WATER QUALITY,
California Univ., Davis. Dept. of Civil Engineering.
O. J. Helweg, and J. W. Labadie.
Water Resources Bulletin, Vol. 12, No. 4, p 681-693, August 1976. 6 fig, 1 tab, 9 ref. OWRT B-086-COLO(4).

Descriptors: *Groundwater, *Management, *Water quality control, *Algorithms, Irrigation, Conjunctive use, Salinity, *Salts, Groundwater movement, Mathematical models, Systems analysis, Dissolved solids.
Identifiers: Screening model, Cost-effective, Water degradation, Salt accumulation.

Presented is a brief review of the problem of groundwater degradation from irrigation and of present approaches to controlling groundwater quality. As an alternative to these approaches, a management scheme called the Accelerated Salt TRANsport (ASTRAN) method is proposed as being a feasible solution to the problem of salt build-up in irrigated areas. A management algorithm for implementing the ASTRAN method is described. Results from modeling studies indicate that the ASTRAN method is cost-effective and encourages conjunctive use of ground and surface water. (Bell-Cornell)
W78-00442

FACTORS AFFECTING NUTRIENT LOADS IN SOME IOWA STREAMS,
Iowa State Univ., Ames. Dept. of Animal Ecology.
J. F. Jones, B. P. Borofka, and R. W. Bachmann.
1976. Water Research, Vol. 10, p 117-122. 2 fig, 7 tab, 42 ref. OWRT A-049-IA(3).

Descriptors: *Eutrophication, *Phosphorus, *Nitrogen, *Land use, *Regression analysis, *Watershed, *Water quality, *Nutrients, *Drainage systems, *Nitrogen compounds, Marshland, Row crops, Pasture, Cities, Runoff, *Iowa.
Identifiers: Nitrate nitrogen(NO3-N), Ammonia nitrogen(NH3-N).

Measurements of plant nutrient loads for a number of tributary streams were made in a recent study of eutrophication in lakes in northwestern Iowa. The relationship between land use and nutrient output was studied over 2 years, 1971-1973, in order to understand consistent differences in phosphorus (P) and nitrogen (N) concentrations found in the streams. Outputs of N and P were determined by integrating flow and concentration measurements over time to yield annual losses from each watershed greater than 100 hectares. A land use (row crop, grasslands, marshlands and urban areas) and livestock (animal uniter per hectare) inventory was taken for 34 watersheds. A linear model was used to analyze the relationship between land use and N, P, nitrate nitrogen (NO3-N) and ammonia nitrogen (NH3-N). Regression analysis was used to conclude that P had a significant positive correlation with the number of animal units; that the percentage of the area in marshland had a significant negative correlation

with N 3-N concentrations, since these areas of anaerobic decomposition may reduce NO3-N by denitrification and gaseous loss of N2; that N 3-N was significantly related to the number of animal units. Additional regression analysis was conducted to study if animal placement in the watershed influenced P or NH3-N losses. Independent variables were year classes and whether feedlots or pastures had drainage to streams or tile intakes. The only sigificant variable was the number of feedlot animal units per hectare with drainage to streams or tiles. Statistically, P and N losses have not been identified with the percentage of watershed in row crops, grassland or urban areas, but sampling indicated high p, NO3-N and NH3-N in runoff from these areas. (Gentry - North Carolina)
W78-00449

PROTECTION OF VIRUSES DURING DISINFECTION BY ADSORPTION TO PARTICULATE MATTER,
Maine Univ. at Orono. Dept. of Civil Engineering.
G. D. Boardman, and O. J. Sproul.
Journal Water Pollution Control Federation, Vol. 49, No. 8, p 1857-1861, August, 1977. 7 tab, 9 ref. OWRT A-030-ME(3).

Descriptors: *Viruses, *Bacteriophage, *Disinfection, *Chlorination, *Adsorption, Laboratory tests, Kaolinite, Calcium carbonate, Aluminum, Sewage bacteria, Analytical techniques, Waste water treatment, Sewage treatment.
Identifiers: Virus inactivation, T sub 7.

Since viruses may survive waste water disinfection processes when they are adsorbed or embedded in solids, a study was undertaken to determine the actual extent of protection of viruses by adsorption onto particles during chlorination. Kaolinite, hydrate aluminum oxide, and calcium carbonate were used as adsorbents for the bacteriophage T sub 7. To produce the experimental systems, virus concentrations of between 200,000 PFU/ml and 400,000 PFU/ml were added to solutions which contained an adsorbent and were adjusted to pH 7. Centrifugation of solutions resulted in relatively high virus recovery. The virus was recovered by sonification of a 10-ml sample at an energy level of 22.5 watts for 30 seconds. Losses of virus prior to pH adjustment suggested that viral infectivity may be reduced at elevated pH values. Control studies on inactivation of T sub 7 with chlorination indicated that a chlorine dosage of 0.036 mg Cl/liter was sufficient for 100% inactivation. Inactivation by chlorination was not significantly affected by the presence of kaolinite, hydrated aluminum oxide, or calcium carbonate. It is suggested that total encapsulation of an infectious agent is necessary for protection from chlorination. (Schulz-FIRL)
W78-00450

AQUATIC INSECT DIVERSITY AND BIOMASS IN A STREAM MARGINALLY POLLUTED BY ACID STRIP MINE DRAINAGE,
Pennsylvania State Univ., University Park. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W78-00451

A STUDY OF THE WASTE WASH WATER FROM EGG WASHING MACHINES,
Richard B. Russell Agricultural Research Center, Athens, GA.
For primary bibliographic entry see Field 5A.
W78-00458

EQUALIZATION OF LIQUID WASTES,
New Jersey Inst. of Tech., Newark. Dept. of Civil and Environmental Engineering.
I. Metzger.
In: Proceedings of the 21st Industrial Waste Conference, Purdue University, p 338-347, May 1966. Engr. Ext. Series No. 121.

Descriptors: *Flow rates, *Hydraulic equipment, Design data, Feasibility studies, Flow measurement, Hydraulic design, Laboratory tests, Water measurement.
Identifiers: *Equalization(Liquid wastes).

The problem resulting from shock loads can be alleviated by attempting to reduce the extremes in concentration and product a more uniform, or equalized, raw waste. Various methods used for equalization are discussed. The objective of this work was to develop a rational approach to the design of equalization tanks for continuous flow treatment. Flow-through considerations for the common sedimentation tank and rectangular equalization tank are presented. Experimental work using dye as a flow indicator show much improved flow characteristics from an experimental model tank using a triangular shaped outlet section. Flow-through curves for th conventional tanks and the experimental tank are given. (Prodehl - EPA, Corvallis)
W78-00484

5C. Effects Of Pollution

AQUATIC SURVEY OF BIG CREEK, RICH COUNTY, UTAH,--A CRITICAL HABITAT STREAM ON NATIONAL RESOURCE LANDS AFFECTED BY LIVESTOCK.
Brigham Young Univ., Provo, Utah. Center for Health and Environmental Studies.
For primary bibliographic entry see Field 6G.
W78-00004

AQUATIC SURVEY OF BIRCH CREEK, BEAVER COUNTY, UTAH--CRITICAL HABITAT STREAM ON NATIONAL RESOURCE LANDS AFFECTED BY LIVESTOCK,
Brigham Young Univ., Provo, Utah. Center for Health and Environmental Studies.
For primary bibliographic entry see Field 6G.
W78-00005

EFFECTS OF THE URBAN ENVIRONMENT ON HEAVY RAINFALL DISTRIBUTION,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 2B.
W78-00091

COASTAL WATER RESEARCH PROJECT ANNUAL REPORT FOR THE YEAR ENDED 30 JUNE 1976.
Southern California Coastal Water Research Project, El Segundo.
Southern California Coastal Water Research Project Annual Report for the Year Endedd 30 June 1976, 1977. 268 p, 4 append.

Descriptors: *Water pollution sources, *Water pollution effects, *Baseline studies, *Outfall sewers, *Environmental effects, Continental shelf, *California, Resources development, Biomass, Diseases, Shellfish, Fish, Heavy metals, Pacific Ocean.
Identifiers: *Outer Continental shelf, *Resources management, Southern California, Species diversity index.

The annual report of the Southern California Coastal Water Research Project contains articles (separately abstracted) summarizing studies on the environmental effects of the disposal of municipal waste water on the continental shelf of Southern California. The articles are arranged under the following headings: sources of pollutants, distribution of pollutants, uptake in marine life, effects on marine life, the camera as an instrument, and benthic ecology. Four appendices give additional information on organization, meetings, publications and sampling at sea. (See W78-00135 thru W78-00163) (Sinha-OEIS)
W78-00134

CHROMIUM SPECIATION IN MUNICIPAL WASTEWATER AND SEAWATER,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5B.
W78-00135

INPUTS OF DDT AND PCB,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5B.
W78-00136

INPUTS OF CHLORINATED BENZENES,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5B.
W78-00137

TECHNIQUES FOR COLLECTING DDT AND PCB IN AERIAL FALLOUT,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5A.
W78-00138

AERIAL FALLOUT OF METALS DURING A BRUSHFIRE,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5A.
W78-00139

SEDIMENTS AS SOURCES OF DDT AND PCB,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5B.
W78-00140

CHARACTERISTICS OF MUNICIPAL WASTEWATER DISCHARGES, 1975,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5B.
W78-00141

MEASUREMENTS OF SUBTHERMOCLINE CURRENTS,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5A.
W78-00142

CURRENT VELOCITIES REQUIRED TO MOVE SEDIMENTS,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5B.
W78-00143

SLUDGE IN SANTA MONICA BAY,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5B.
W78-00144

CHANGES IN THE GRAIN SIZE OF SEDIMENTS ON THE PALOS VERDES SHELF,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 2J.
W78-00146

VIRUSES AND BACTERIA IN COASTAL WATERS AND SHELLFISH,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5A.
W78-00147

MERCURY IN MUSSELS,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5A.
W78-00148

MERCURY IN BENTHIC ANIMALS,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5A.
W78-00149

METALS IN SCALLOPS,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5A.
W78-00150

UPTAKE AND EFFECTS OF CHROMIUM ON MARINE FISH,
Southern California Coastal Water Research Project, El Segundo.
M. J. Sherwood, and J. L. Wright.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 123-128, 1977. 2 fig, 2 tab, 1 ref.

Descriptors: *Water pollution effects, *Chromium, *Heavy metals, *Fish, California, Continental shelf, Environmental effects, Water pollution sources, Resources development.
Identifiers: *Outer continental shelf, Southern California, Hexavalent chromium, Citharichthys stigmaeus.

Objectives of the study were to examine the effects of concentrations of hexavalent chromium below 5 mg/l and to determine the effects of trivalent cromium precipitate on the sanddab. It appears that (1) dissolved hexavalent chromium is biologically available to the speckled sanddab but the trivalent hydroxide precipitate is not; (2) accumulation of hexavalent chromium in this species occurs at very low exposure levels, appears to be unregulated, and is proportional to exposure concentrations; and (3) the levels of dissolved hexavalent chromium that affect feeding behavior, limit growth, disrupt tissue structure, or cause mortality are substantially higher than those likely to be encountered in the ocean. (See also W78-00134) (Sinha - OEIS)
W78-00151

CHEMICAL STUDIES OF OFFSHORE OIL PLATFORMS,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5A.
W78-00152

FIN EROSION PREVALENCE AND ENVIRONMENTAL CHANGES,
Southern California Coastal Water Research Project, El Segundo.
A. J. Mearns, and M. J. Sherwood.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 139-141, 1977. 1 fig, 1 ref.

Descriptors: *Water pollution effects, *Environmental effects, *Hydrogen sulfide, *Fish diseases, *Sediments, Metals, California, Continental shelf, Resources development, Water pollution sources.
Identifiers: *Outer continental shelf, Southern California, Fin erosion, Microstomus pacificus, Resources management.

Anomalies of several types are present in southern California trawl-caught benthic fishes. Data collected in 1975 and early 1976 are consistent with information obtained in past surveys in that among the diseases with external symptoms, the one most frequently observed is fin erosion, and the species most often affected is the Dover sole Microstomus pacificus. Dover sole with fin erosion have been most prevalent on the Palos Verdes shelf, the site of a major municipal wastewater outfall system. Data suggest that new cases of fin erosion are still being initiated on the shelf. Within recent years there have been a number of changes in the chemistry and biology of the benthic environment on the Palos Verdes shelf one of which involves hydrogen sulfide. Data collected indicated that the sulfide field decreased from approximately 7-10 sq km in 1973 to less than 1 sq km in 1975. If the hydrogen sulfide was a significant factor in initiation of the disease, recent reductions in the prevalence of fin erosion in Dover sole would be expected. Since this trend is not evident it appears that hydrogen sulfide in the Palos Verdes sediments is not a major factor in the initiation of the disease. (See also W78-00134) (Sinha - OEIS)
W78-00153

COMPARISON OF FIN EROSION DISEASE: LOS ANGELES AND SEATTLE,
Southern California Coastal Water Research Project, El Segundo.
M. J. Sherwood, and B. B. McCain.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 143-147, 1977. 3 tab, 2 ref.

Descriptors: *Water pollution effects, *Environmental effects, *Fish diseases, Outfall sewers, Polychlorinated biphenyls, California, Washington, New York, Continental shelf, Resources development.
Identifiers: *Outer continental shelf, Southern California, Resources management, Fin erosion, New York Bight, Chlorinated hydrocarbons, Microstomus pacificus, Platichthys stellatus.

Levels of chlorinated hydrocarbons and trace elements were measured in Dover Sole (Microstomus pacifucus) from southern California and in starry flounder (Platichthys stellatus) from the State of Washington. A preliminary comparison of the trace constituents in fish with and without fin erosion suggest that total PCB is elevated in the tissues of diseased individuals of both species. Similar trends for both species were not identified for p,p'-DDE or the metals considered here. The results do imply cause and effect; however, if similarities in tissue levels of trace contaminants in the two species occur, it is possible that the common constituent is involved in the disease in both regions. The common factor identified in this preliminary study is total PCB. (See also W78-00134) (Sinha - OEIS)
W78-00154

FIN EROSION DISEASE INDUCED IN THE LABORATORY,
Southern California Coastal Water Research Project, El Segundo.
M. J. Sherwood.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 149-153, 1977. 3 tab, 1 ref.

Descriptors: *Water pollution effects, *Fish diseases, *Sediments, *Environmental effects, Outfall sewers, Metals, California, Resources development, Water pollution sources.
Identifiers: *Outer Continental Shelf, Southern California, *Chlorinated hydrocarbons, Resources management, Microstomus pacificus, Palos Verdes sediments.

This experiment shows that changes in fin condition can be induced in Dover sole in the laboratory by exposing apparently healthy individuals to contaminated Palos Verdes sediments. The changes resemble early stages of fin erosion seen in field specimens. In general, levels of chlorinated hydrocarbons in the exposed fish fall between the levels reported for Palos Verdes specimens with no apparent fin erosion and those with moderate to severe fin erosion. Although not indicative of cause and effect, the results of this test, in conjunction with measurements of chlorinated hydrocarbons in field specimens, suggest that certain levels of one or more chlorinated hydrocarbons may be associated with the onset of the fin erosion disease symptoms. The uptake of chlorinated hydrocarbons by the test fish suggests that chlorinated hydrocarbons can be accumulated directly from the sediments. See also W78-00134) (Sinha-OEIS)
W78-00155

ACUTE RESPONSES OF MARINE INVERTEBRATES TO CHROMIUM,
Southern California Coastal Water Research Project, El Segundo.
P. S. Oshida, and J. L. Wright.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 155-159, 1977. 2 ref.

Descriptors: *Water pollution effects, *Toxicity, *Chromium, California, Environmental effects, Water pollution sources, Continental shelf.
Identifiers: *Outer Continental Shelf, Southern California, Resources management, Ophiothrix spiculata, Themiste sp., Sicyonia ingentis, Neanthes arenaceodentata.

The toxicity of chromium against local marine invertebrates has been tested. Both static and flow-through seawater systems have been used in the effort to determine relative sensitivities to chromium of a shrimp, a brittle star, and a sipunculid worm. Limited but informative experiments were conducted with hexavalent chromium as potassium dichromate and trivalent chromium as chromic chloride. Studies indicate that adult Sicyonia ingentis and Themiste sp. appear to be insensitive to chromium at the low levels usually found in the ocean. However, Ophiothrix spiculata and Neanthes arenaceodentata are sensitive and, hence, may be effective bioassay animals for the study of chromium toxicity. The brittle star and polychaete were the most sensitive to chromium and revealed this sensitivity in anomalous behavior and reproduction. (See also W78-00134) (Sinha-OEIS)
W78-00156

EFFECTS OF CHROMIUM ON REPRODUCTION IN POLYCHAETES,
Southern California Coastal Water Research Project, El Segundo.
P. S. Oshida.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 161-167, 1977. 1 fig, 4 tab, 1 ref.

Descriptors: *Water pollution effects, *Chromium, *Toxicity, *Reproduction, *Worms, Waste disposal, Industrial wastes, Municipal wastes, California, Continental shelf, Environmental effects, Water pollution sources.
Identifiers: *Outer Continental Shelf, Southern California, Resources management, Neanthes arenaceodentata.

Chromium is discharged into the marine waters off southern California in industrial and municipal wastewater effluents. Major goals in the investigation of effects in the marine environment have been to identify the forms of chromium that are biologically available, to determine the level at which chromium has an observable effect on marine biota, and to determine the environmental levels of chromium that can be considered safe

with the respect to the health of this biota. Tests include monitoring the survival, behavior, and reproduction of Neanthes arenaceodentata, a local marine worm, exposed to several concentrations and forms of chromium. Any assessment of the results of the two long-term hexavalent chromium toxicity tests has to be made with reservations, as the second experiment is still in progres. (See also W78-00134) (Sinha - OEIS)
W78-00157

FAUNA OF OFFSHORE STRUCTURES,
Southern California Coastal Water Research Project, El Segundo.
M. J. Allen, and M. D. Moore.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 179-186, 1977. 5 fig, 1 tab, 4 ref.

Descriptors: *Environmental effects, *Offshore platforms, *Ecosystems, *Resources development, *Outfall sewers, Ecology, California, Continental shelf.
Identifiers: *Outer Continental Shelf, Southern California, Offshore structures, Resources management, Oil platforms, Artificial reefs.

The fauna around the offshore structures is considerably more abundant than that of the surrounding soft-bottom area. The species composition at the artificial structures differs from that of the soft bottom, because these attract species that require a hard surface for attachment or crevices for refuge. At least in shallow water, the fauna around the oil platforms are more abundant and diverse than that of the outfalls, and hard-bottom control areas. The species composition at both structures varies with depth. (See also W78-00134) (Sinha - OEIS)
W78-00158

RESPONSE AND RECOVERY OF THE BENTHOS AT ORANGE COUNTY,
Southern California Coastal Water Research Project, El Segundo.
C. S. Greene.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 197-203, 1977. 3 fig, 2 ref.

Descriptors: *Environmental effects, *Outfall sewers, *Waste disposal, *Water pollution, *Resources development, *Baseline studies, Toxicants, Metals, Polychlorinated hydrocarbons, Metals, California, Continental shelf, Water pollution sources.
Identifiers: *Outer Coninental Shelf, Southern California, Subthermocline diffusers, Resources management.

In 1971, Orange County Sanitation Districts terminated the discharge of municipal wastewaters through a shallow, inshore submarine outfall and began discharging through a modern subthermocline diffuser. This provided a unique opportunity to study the progress of the 'stress' and 'recovery' that would most likely occur around these outfalls and to obtain an insignt into the rates at which these processes progressed. After 4.5 years of operation the subthermocline diffuser system has had a measurable effect on the animals living in the sediments around it. This effect is manifested in the enhanced abundances of several 'indicator-like' species in response to increased inputs of organic material. Because of the apparently scoured condition of the sediments, the enhanced levels of potentially toxic trace metals and PCB may normally be somewhat higher than measured and should be watched. (See also W78-00134) (Sinha - OEIS)
W78-00159

PARTIAL RECOVERY OF THE BENTHOS AT PALOS VERDES,
Southern California Coastal Water Research Project, El Segundo.
C. S. Greene.
In: Southern California Coastal Water Research Project Final Report for the Year Ended 30 June 1976, p 205-210, 1977. 4 fig.

Descriptors: *Benthos, *Environmental effects, *Outfall sewers, *Sediments, Waste disposal, Hydrogen sulfide, Water pollution sources, California, Continental shelf, Resources development.
Identifiers: *Outer continental shelf, Southern California, Resources management, Palos Verdes sediments.

The basic biological parameters around deepwater outfalls, such as those on the Palos Verdes shelf, have changed in response to modifications in the physical/chemical environment. These parameters-- the areal distributions of the number and kinds of organisms and the biomass (amount of biological material)--are known to change in response to the stresses of pollution and are, therefore, considered to be reliable indicators of the conditions that exist on this shelf. A group of species that has been associated with extremely stressful conditions around outfalls has become greatly reduced in numerical abundance, and species that would not or could not previously occupy these sediments are now present in high quantity (biomass). Although the chemical nature of the sediments is still far from natural, the observed biological events indicate that this environment has improved as a biological habitat. (See also W78-00134) (Sinha - OEIS)
W78-00160

COMPARISON OF THE BENTHOS AT SEVERAL WASTEWATER DISCHARGE SITES,
Southern California Coastal Water Research Project, El Segundo.
A. J. Mearns, and C. S. Greene.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 211-216, 1977. 3 tab, 3 ref.

Descriptors: *Benthos, *Water pollution effects, *Environmental effects, *Biomass, Waste disposal, Outfall sewers, California, Continental shelf, Water pollution sources, Resources development.
Identifiers: *Outer continental shelf, Southern California, Species diversity index, Resources management.

The benthos at five specific outfall areas were compared for biomass, abundance, number of species, diversity, and richness. The result is a scan of some of the effects of wastewater on a 300-km section of the southern California coast. The comparison indicates that the major effect of the wastewaters on the benthic infauna in the outfall area is to increase the abundance or organisms and to decrease the diversity. (See also W78-00134) (Sinha - OEIS)
W78-00161

REGIONAL AND LOCAL VARIATION OF BOTTOM FISH AND INVERTEBRATE POPULATIONS,
Southern California Coastal Water Research Project, El Segundo.
M. J. Allen, and R. Voglin.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 217-221, 1977. 1 fig, 1 tab, 4 ref.

Descriptors: *Water pollution effects, *Environmental effects, *Invertebrates, *Demersal fish, Outfall sewers, Continental shelf, California, Resources development, Water pollution sources.
Identifiers: *Outer continental shelf, Southern California, Species diversity index, Resources management.

During the past year, catch statistics from over 2,400 samples taken off the coast between Santa Barbara and San Diego and near some of the offshore islands were analyzed. Contemporary surveys provided the bulk of the samples analyzed. However, regional and temporal variations are large and reflect differences in gear and fishing technique as well as real differences in abundance and diversity. Although data suggest that the Los Angeles and Orange County coastal areas have been supporting the most abundant and diverse fish fauna, some qualifications are necesary. Catches in any area vary seasonally and from year to year. (See also W78-00134) (Sinha - OEIS)
W78-00162

LIFE HISTORY OF THE DOVER SOLE,
Southern California Coastal Water Research Project, El Segundo.
M. J. Allen, and A. J. Mearns.
In: Southern California Coastal Water Research Project Annual Report for the Year Ended 30 June 1976, p 223-228, 1977. 2 fig, 14 ref.

Descriptors: *Water pollution effects, *Environmental effects, *Life history studies, *Growth rates, Outfall sewers, California, Continental shelf, Resources development, Water pollution sources.
Identifiers: *Outer continental shelf, Southernia, Fin erosion disease, Microstomus pacificus, Geographic range, *Dover sole.

One of the marine fishes in southern California with clearly identifiable health problems as a result of wastewater pollution is the Dover sole (Microstomus pacificus). The species is one of the most frequently occuring and abundant flatfishes in southern California at depths from 50 to 200 m and is therefore an important member of fish communities of the deeper portion of the mainland shelf. It shows obvious responses to wastewater discharge; populations near outfalls are generally more abundant, exhibit a higher prevalence of fin erosion disease, and show growth rates that are lower than those of other mainland coastal populations but higher than those of fish at Santa Catalina Island. Southern California populations may be largely the result of larval recruitment from spawning populations north of Point Conception, but this has yet to be confirmed. The fact that growth rates are lower in southern California than to the north suggests that southern California, which is near the southern end of the specie's geographic range, may not have optimal conditions for producing and maintaining commercially important stocks of Dover Sole. (See also W78-00134) (Sinha - OEIS)
W78-00163

SUPERTANKERS AND SUPERPORTS (CITATIONS FROM THE ENGINEERING INDEX DATA BASE).
National Technical Information Service, Springfield, VA.
For primary bibliographic entry see Field 5B.
W78-00164

ESTIMATING BIOAVAILABILITY OF SEDIMENT-BOUND TRACE METALS WITH CHEMICAL EXTRACTANTS,
Geological Surve, Menlo Park, CA. Water Resources Div.
For primary bibliographic entry see Field 5A.
W78-00196

NATIONAL WATER QUALITY INVENTORY. 1974 REPORT TO THE CONGRESS. VOLUME I.
Environmental Protection Agency, Washington, DC. Office of Water Planning and Standards.
For primary bibliographic entry see Field 5A.
W78-00214

FACTORS AFFECTING DIMETHYLNITROSAMINE FORMATION IN SAMPLES OF SOIL AND WATER,
Cornell Univ. Agricultural Experiment Station, Ithaca, NY. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W78-00215

DECOMPOSITION OF AQUATIC BIOTA AND SEDIMENT FORMATION: ORGANIC COMPOUNDS IN DETRITUS RESULTING FROM MICROBIAL ATTACK ON THE ALGA CERATIUM HIRUNDINELLA,
Freshwater Biological Association, Ambleside (England).
P. A. Cranwell.
Freshwater Biology, Vol. 6, No. 1, February 1976, p 41-48. 1 fig, 4 tab, 36 ref.

Descriptors: *Sedimentation, *Decomposing organic matter, *Microbial degradation, Detritus, Aerobic conditions, Simulation analysis, Algae, Lake sediments, Lakes.
Identifiers: *Ceratium hirundinella, *Lake Blelham Tarn(United Kingdom), Autochthonous organic matter.

In a study designed to measure the impact of autochthonous organic matter decomposition on the formation of lake sediments, the freshwater algal Ceratium hirundinella was collected from Lake Blelham Tarn, a 17-ha productive pond in the English Lake District of the United Kingdom during the summer bloom period. The sample was submitted to two sets of decomposition conditions: aerobic conditions and one of decreasing oxygen concentration. The benzene-methanol extract of the matter remaining after the microbial attack on the algal samples from both experiments was separated into its components. Comparison of the components thus obtained from the fresh algal material facilitated recognition of algal compounds of sufficient stability to act as indicators of an algal contribution to sedimentary organic lake materials. The dominant C29, C31 and C33 n-alkanes and also cholesterol were recognized as the most suitable of these indicators. Similarities in occurrence of the indicator compounds in degraded algal organic matter and in sediments of productive lakes are believed to represent a contribution of autochthonous material to the sediment. (Harris-Wisconsin)
W78-00218

EFFECT OF ILLUMINATION CONDITIONS ON VEGETATIVE MULTIPLICATION OF THE CELLS AND SEXUAL REPRODUCTION OF TWO SPECIES OF CENTRICAL DIATOMACEOUS ALGAE,
Institute of Biology of the Southern Seas, Sevastopol (USSR).
A. M. Roshchin.
Soviet Plant Physiology, Vol. 23, No. 4, July-August 1976, p. 601-605. 4 tab, 7 ref. Translated from Fiziologiya Rastenii, (Same vol and date) p. 715-719.

Descriptors: *Photoperiodism, *Cytological studies, Diatoms, Plankton, Algae, Light, Germination, Light duration, Plant physiology.
Identifiers: *Coscinodiscus janischii A. S., *Chaetoceros curvisetus Cl., *Vegetative cell multiplication, *Germ cell formation.

The influence of photoperiod light on vegetative cell multiplication as well as on germ cell formation of the planktonic diatomaceous algae Coscinodiscus janischii A. S. and Chaetoceros curvisetus Cl. was investigated, with continuous and periodic illumination used in the experiments with both species. The rate of vegetative cell multiplication in C. janischii increased with an increase of illumination from 0.5 to 2.5 x 103 lx,. An increase in illumination to 4 x 103 did not increase vegetative cell multiplication. The greatest number of germ cells was formed at 2.5 x 103 lx, with spermatogonia 15 times more numerous than oogonia. A decrease of illumination caused germ cell formation to decline more sharply than the multiplication of vegetative cells. Decrease in a photoperiod at the illumination of 2.5 x 103 lx negatively affected both vegetative cell multiplication and germ cell formation, but the rate of germ cell formation decreasd more sharply than the vegetative cell multiplication rate. Maximal vegetative cell multiplication in Ch. curvisetus occurred under continuous illumination. It was lower under periodic illumination (8 and 16 hours). Germ cell formation did not occur under illumination of 2.5 x 103 lx or under conditions of either continuous darkness or continuous light, but only during periodic illumination. On basis of these data, C. janischii is characterized as a long-day species and Ch. curvisetus as a short-day species. (Harris-Wisconsin)
W78-00219

RESPONSE OF POTAMOGETON PECTINATUS L. TO NORFLURAZON,
Massachusetts Univ., East Wareham. Lab. of Experimental Biology.
For primary bibliographic entry see Field 5G.
W78-00221

THE INFLUENCE OF EXTREMELY HIGH CONCENTRATIONS OF INORGANIC P AT VARYING PH ON THE GROWTH AND PHOTOSYNTHESIS OF UNICELLULAR ALGAE,
Copenhagen Univ. (Denmark). Freshwater Biological Lab.
E. S. Nielsen, and T. Rochon.
Internationale Revue Der Gesamten Hydrobiologie, Vol. 61, No. 4, p. 407-415, 1976. 9 fig, 5 ref.

Descriptors: *Phosphates, *Photosynthesis, Chemical wastes, Water pollution sources, Growth rates, Populations, Chlorella, Diatoms, Cultures, Hydrogen ion concentration, Inorganic compounds, Lakes.
Identifiers: *Chlorella pyrenoidosa, *Nitzschia palea, *Lake Frederiksborg Slots(Denmark), *Lake Esrom(Denmark).

Effects of phosphate concentration on photosynthetic rate were studied on cultures of Chlorella pyrenoidosa and Nitzschia palea from Lake Frederiksborg Slots and Lake Esrom S. Denmark. Phosphate concentrations of 2500 mg P/l at pH 7.5, decreased the rate of C. pyrenoidosa, while the resistance of N. palea was far lower. At pH's of 6.3-7.3, the growth rate of C. pyrenoidosa multiplied by a factor of 6.6 per day at all concentrations up to 500 mg P/l. It decreased to 4.0 at 2000 mg. P.l., and was constant during the whole experiment. Growth rates of C. pyrenoidosa are similar at 5 mg P/l whether the experiments are at pH 5.8-6.3 or at pH 8.6-9.5. The growth rate of C pyrenoidosa is independent of pH at low concentrations of phosphate in contrast to high concentrations. At 5 mg P.l (starting at pH 6.2), N. palea grew at a daily multiplication factor of 1.5. At pH 9.1, the factor became 3.3. At pH 5.5, the phosphate concentrations of 500 mg P.l, no growth took place with N. palea. The rate increased with increasing pH. At pH 8.7, the cell number increased daily by a factor of 2.0. At phosphate concentrations varying between 16 and 500 mg P/l, pH varied between 8.2 and 8.5 the first two days, and 32 mg P.l is above the optimum phosphate concentration. (Spaeth-Wisconsin)
W78-00222

IMPACT OF ACID PRECIPITATION ON FRESHWATER ECOSYSTEMS IN NORWAY,
Norsk Inst. for Vannforskning, Blindern.
R. F. Wright, T. Dale, E. T. Gjessing, G. R. Hendrey, and A. Henriksen.
Water, Air, and Soil Pollution, Vol. 6, No. 2-4, Sept.-Nov. 1976, p. 483-499. 12 fig, 1 tab, 45 ref.

Descriptors: *Air pollution, *Rain water, *Precipitation(Atmospheric), *Environmental effects, Sulphates, Nitrates, Acidic water, Water pollution sources, Acidity, Vegetation effects, Habitats, Population.
Identifiers: *Norway, *Acid rain.

Polluted atmospheric precipitation which occurs over large areas of Scandinavia contains high concentrations of H(+), SO and NO ions in addition to heavy metals such as Cu, Zn, Cd, and Pb that mainly originate in the industrialized areas of Great Britain and central Europe. A study, based on a survey of 155 random-sampled lakes in southern Norway, measures the impact of acid precipitation caused by this pollution on the chemistry and biology of Norwegian freshwaters. Since much of Norway is underlain with lightly resistant granitic rock covered with only thin, inconsolidated glacial till, the inland waters are chacterized by low conductivities, low concentrations of major ions and low buffer capacities, all of which make its freshwaters highly vulnerable to atmospheric pollutants. The continually-growing inputs of atmospheric acid pollutants have resulted in significant increases in conductivity and hardness and decreases in pH levels. The atmospheric sulphate has replaced bicarbonate as the major anion in many lakes. High concentrations of Al in acid lakes suggest that pH levels in watershed soils have dropped below 5, causing the mobilization and washout of Al. Increasing acidity beginning at pH 6.0 has caused a decline in the number of phytoplanktonic, zooplanktonic and zoobenthic species plus a decrease in the abundance of green algae. Increased water acidity has also interfered with reproduction and spawning of fish. (Harris-Wisconsin)
W78-00226

ACID PRECIPITATION IN CANADA,
Department of the Environment, Ottawa (Ontario).
For primary bibliographic entry see Field 5B.
W78-00227

PHOTOIMPULSIVE CHARACTERISTICS OF THE PHOTOSYNTHESIS OF CHLORELLA VULGARIS,
Institut Fiziki, Krasnoyarsk (USSR).
A. P. Trenkenshu, F. Ya. Sid'ko, and V. N. Belyanin.
Soviet Plant Physiology, Vol. 23, No. 4, July-August 1976, p. 590-596. 4 fig, 15 ref. Translated from Fiziologiya Rastenii, (same vol and date), p. 702-709.

Descriptors: *Photosynthesis, *Chlorella, *Growth rates, Plant pigments, Laboratory tests, *Chlorophyll, Cytological studies.
Identifiers: *Photosynthetically active radiation, Chlorella vulgaris, Chlorophyll-a, Impulsive illumination, Photoimpulsive irradiation.

The dependence of the rate of growth, chlorophyll-a cell content and efficiency of photosynthesis upon the frequency of impulses and intensity of the effective flux of photosynthetically active radiation (PAR) was investigated for the alga Chlorella vulgaris. Duration of light and dark periods for three photoimpulse regimes in these experiments was 2 x 10-3, 6 x 10-3, and 10-2 seconds. The value of irradiance during the illumination periods varied between 50 and 1400 W/m2 PAR. The results show that the relative rate of growth of Chlorella under impulsive illumination is lower than under continuous illumination for radiances up to 600-650 W/m2 PAR. The smallest difference between growth rates in these two illumination regimes (continuous light contrasted with impulsive light) was found at a light impulse of 2 msec duration. Decrease in dry biomass with increase in irradioation was observed for both regimes. However, photoimpulsive irradiation was characterized by a more significant decrease of pigment concentration than

the continuous irradiation. The decrease in values for dry biomass and pigment concentration under the influence of flux irradiation is especially significant within 50 to 300 W/m2 PAR range. The maximal photobiosynthesis efficiency (18%) occurred at 90-110 W/m2 PAR where the alga was exposed to alternating periods of light and dark of 2 msec duration. (Harris-Wisconsin)
W78-00229

OBSERVATIONS ON SOME INTERESTING FRESHWATER ALGAE FROM THE NETHERLANDS,
Vrije Univ., Amsterdam (Netherlands). Afdeling Plantensystematiek.
A. J. Dop, and M. Vroman.
Acta Botanica Neerlandica, Vol. 25, No. 5, October 1976, p. 321-328. 31 ref.

Descriptors: *Algae, *Systematics, Ecology, Benthic flora, Investigations, Ponds, Eutrophication, *Chlorophyta, *Chrysophyta, Phaeophyta, Water pollution effects.
Identifiers: *Xanthophyceae, *Botshol Pond(Netherlands).

Systematic and ecological investigations on 17 benthic algae species were carried out by placing glass slides in natural habitats. Several records are new for the Netherlands. Most observation were made on material from the Botshol, and irregularly shaped eutrophic pond of about two square kilometers located nine kilometers south of Amsterdam. Two species of Chlorophyceae were found: Dicranochaete reniformis Hieronymus, Ectogeron elodeae Dangeard. A single Xanthophyceae was found: Mischococcus confervicolum Naegeli. The following species of the Chrysophyceae were found: Sphareridiothrix compressa Pascher and Vlk, Phaeoplaca thallosa Chodat, Lagynion scherffelii Pascher, Lagynion janei Bourrelly, Stephanoporus tubulosus Pascher, Chrysophaera gallica Bourrelly, Chrysopyxis cf. bipes Stein, Chrysochaete brittannica (Godward) Rosenberg, Epipyxis borgei (Lemmermann) Hilliard et Asmund, Epipyxis utriculus Elrenberg. Ruttnera spectabilis Geitler, Apistonema pyrenigerum Pascher, and Phaeothamnion borzianum Pascher. The following specie of the Phaeophydeae was found: Porterinema fluviatile (Porter) Waern. Culturing experiments are being done to determine if freshwater clones of Apistonema are part of the life cycle of Hymenomonas rosela. (Spaeth-Wisconsin)
W78-00230

THE FATE OF SELECT PESTICIDES IN THE AQUATIC ENVIRONMENT,
Southeast Environmental Research Lab., Athens, Ga.
For primary bibliographic entry see Field 5B.
W78-00231

A CARBON FLOW MODEL OF EPIPELIC ALGAL PRODUCTIVITY IN ALASKAN TUNDRA PONDS,
North Carolina State Univ. at Raleigh. Dept. of Zoology.
D. W. Stanley.
Ecology, Vol. 57, p. 1034-1042, 1976. 5 fig, 22 ref. NSF GV-33853.

Descriptors: *Mathematical models, *Productivity, *Ponds, *Arctic, *Algae, Model studies, Photosynthesis, Respiration, Carbon cycle, *Alaska, *Tundra, Biomes, Primary productivity, Sediments.
Identifiers: Epipelic algae, Barrow(Alas).

Epipelic algal production in arctic tundra ponds near Barrow, Alaska was simulated by a mathematical model utilizing experimental data. Using relatively simple equations and two environmental input variables (light and temperature) the model produces seasonal curves of epipelic algal photosynthesis, simulates the phasing and amplitude of diurnal cycles of productivity, and keeps track of the large day-today variation that commonly occurs in primary production in natural systems. Output from the model was used to construct a hypothetical carbon budget for the epipelic algae. There is a close agreement between the model's estimate of total annual epipelic production and the production estimated from the measured data example: 9.4 g C sq m yr and 10.1 g C sq m yr for the pond in 1971). Of the net annual epipelic production, 3% was consumed by grazers at the sediment surface. The remaining 97% was buried. Only 15.1% of the net annual production was consumed in the form of buried algae by the grazers. Year-to-year differences in total epipelic productivity attributed by the model to variations in light and temperature. (Harris-Wisconsin)
W78-00235

ENVIRONMENTAL CONTROL OF PRIMARY PRODUCTIVITY IN ALASKAN TUNDRA PONDS,
North Carolina State Univ. at Raleigh. Dept. of Zoology.
D. W. Stanley, and R. J. Daley.
Ecology No. 57, p. 1025-1033, 1976. 7 fig, 33 ref. NSF Grant GV-33853.

Descriptors: *Tundra, *Ponds, *Photosynthesis, *Primary productivity, Biomes, Algae, Temperature, Light intensity, Phosphates, Diatoms, Photoperiodism, *Alaska, Water pollution effects.
Identifiers: Point Barrow(Alas), Epipelic algae.

The study, a part of the US Tundra Biome (IBP), was designed to investigate the photosynthetic response of tundra pond alga to various combinations of temperature, light intensity and phosphate concentration. The ponds used in the study were 50 m in diameter and 20 cm in depth and were located near Barrow, Alaska. The rates of light-saturated photosynthesis showed a broad, single peak in mid-July for epipelic algae and a bi-modal distribution centered around early and late summer for plankton. While the plankton productivity data showed very little diurnal change, peaks in epipelic productivity were skewed toward late afternoon. The epipelic algae also had a higher temperature optimum for photosynthesis than the planktonic algae. In most of the experiments the light saturated photosynthetic rate for plankton was higher at 14C than at 20C, whereas the reverse was true in the epipelic samples. Light inhibition at supraoptimal illumination never occurred in the epipelic measurements, but was common at low temperatures in the planktonic experiments. Planktonic photosynthesis was not inhibited only at the highest temperature tested (20C). None of the short-term phosphate addition experiments resulted in significant changes in either planktonic or epipelic photosynthetic rate at any light or temperature. However, this was not taken as an indication that the Barrow ponds were not phosphorus-limited. (Harris-Wisconsin)
W78-00237

RELATIONSHIPS BETWEEN THE PHYTOPLANKTON AND THE ZOOPLANKTON IN THE RESERVOIRS OF THE KARST REGION IN CROATIA, (IN SERBO-CROATIAN),
Z. Pavletic, I. Matonickin, Z. Maloseja, and I. Habdija.
Acta Bot Croat. 33, p 147-162, 1974.

Descriptors: *Eutrophication, Cyanophyta, Chrysophyta, Karst, *Phytoplankton, Reservoirs, Turbulence, Algae, *Zooplankton, Seasonal, Chlorophyta.
Identifiers: *Yugoslavia, Bajer Reservoir(Croatia).

The spring and autumn plankton at 6 locations in the Omladinsko jezero Reservoir (Yugoslavia) included 135 spp. and, at 5 locations in the Bajer Reservoir in Groski kotar, included 157 spp. from 1970-1972. Different degrees of eutrophication account for these differences. The ratios of phytoplankton to zooplankton were 116:19 and 122:35, respectively. Chrysophytes predominated with a ratio of 58:69 between the 2 lakes. Photophilic blue-green algae and green plankton algae were more numerous in spring than in autumn. This was mainly true for the Omladinsko jezero Reservoir, although the Bajer Reservoir had more green algae in spring than in autumn. The effects of water turbulence on the specific ecological conditions in each case are discussed.--Copyright 1975, Biological Abstracts, Inc.
W78-00238

PRODUCTIVITY OF EPIPELIC ALGAE IN TUNDRA PONDS AND A LAKE NEAR BARROW, ALASKA,
North Carolina State Univ. at Raleigh. Dept. of Zoology.
D. W. Stanley.
Ecology, Vol 57, 1976, p. 1015-1024. 7 fig, 1 tab, 27 ref. NSF GV-33853.

Descriptors: *Tundra, *Ponds, *Biomass, *Productivity, Arctic, Benthic flora, Chlorophyta, Cyanophyta, Phytoplankton, Oil spills, *Alaska, Lakes, Water pollution effects.
Identifiers: *Epipelic algae, Point Barrow(Alas), *Lake Ikroavik(Alas).

The biomass and productivity of benthic algae growing on the sediments (epipelic algae) was measured in several tundra ponds and a lake near Point Barrow, Alaska. Chlorophyta and cyanophyta dominated the epipelic flora of most tundra ponds. The most commlankton was dominated by Chrysophycae and Cryptophyceae. Diatoms and green algae were not numerically significaon genera were Microcystis, Gomphonema, Aphanozomenon, Chlamydomonas, Closterium and Ankistrodesmus. The Phytopnt. The epipelic algae were primarily concentrated in the upper 2 cm of the pond. Epipelic production was limited to a 3-month growing season and reached peak in mid-July. Epipelic productivity ranged from 10-4 g C sq m during a two-year period of observation (1971-73) compared with 1 g C sq m for the pond phytoplankton. An experimental oil spill in one of the ponds reduced epipelic productivity for one year duration to less than one-fourth (3 mg C sq m) of the productivity of surrounding ponds. Fertilization of another ponds caused an increase in epipelic photosynthesis rates to 45 mg C sq m, or two times greater than the rates in the nearby pond for the same period. In Lake Ikroavik, due to lower light, temperature and nutrient values, the photosynthesis rate of epipelic algae never rose above 3 mg C sq m per hour or 2.3 g C sq m per year. (Harris-Wisconsin)
W78-00239

LONG-TERM EFFECTS OF GLYPHOSATE APPLICATIONS TO PHRAGMITES,
New Jersey Agricultural Experiment Station, New Brunswick. Dept. of Soils and Crops.
For primary bibliographic entry see Field 5G.
W78-00250

PHYSICAL OCEANOGRAPHY OF DEEPWATER DUMPSITE 106 FEBRUARY-MARCH, 1976,
National Marine Fisheries Service, Narragansett, RI. Atlantic Environmental Group.
For primary bibliographic entry see Field 1A.
W78-00315

PHYTOPLANKTON IN THE VICINITY OF DEEPWATER DUMPSITE 106,
Woods Hole Oceanographic Institution, MA.
E. M. Hulburt, and C. M. Jones.
In: NOAA Dumpsite Evaluation Report 77-1, Baseline Report of Environmental Conditions in

Deepwater Dumpsite 106, Vol 2, Biological Characteristics, p 219-231, June 1977. 2 fig, 3 tab, 7 ref.

Descriptors: *Waste disposal, *Ecology, *Phytoplankton, *Environmental effects, *Baseline studies, Bioindicators, Water pollution effects, Water pollution sources.
Identifiers: *Outer continental shelf, *Ocean dumping.

Investigations of phytoplankton species composition, distribution with depth, and response to pollutant materials were conducted as part of two cruises to DWD 106 in the summer of 1976. On both the DALLAS cruise of June 1975 and the third KNORR cruise of August - September, 1975, phytoplankton abundance and species composition varied with depth. The complete summary of species for each vertical series of samples, 6 in June, and 3 in August - September, show many species and indicate additions of new species to the listings with increased depth. These summaries are presented. No apparent differences were noted in cells before or after the dump. In particular, at least half a dozen cells of different species were actively swimming, oblivious to the barge water in which they were kept for approximately six hours before examination. (Sinha - OEIS)
W78-00317

GELATINOUS ZOOPLANKTON AT DEEPWATER DUMPSITE 106,
Woods Hole Oceanographic Institution, MA.
For primary bibliographic entry see Field 5B.
W78-00319

APEX PREDATORS IN DEEPWATER DUMPSITE 106,
National Marine Fisheries Service, Narragansett, RI. Narragansett Lab.
J. G. Casey, and J. M. Hoenig.
In: NOAA Dumpsite Evaluation Report 77-1, Baseline Report of Environmental Conditions in Deepwater Dumpsite 106, Vol 2, Biological Characteristics, p 309-376, June 1977. 9 fig, 9 tab, 312 ref.

Descriptors: *Waste disposal, *Water pollution effects, Ecology, *Baseline studies, *Environmental effects, Bioindicators, *Predation, Bibliographies.
Identifiers: *Outer Continental Shelf, *Ocean dumping, Apex predators.

The study of the apex predators in DWD 106, undertaken to assemble baseline data on pelagic predators, consisted of three parts. First the literature was reviewed to produce a working bibliography. Then historical longline catch data for the area in and around the dumpsite were collected, tabulated and analysed. The final stage of the study consisted of three longline research cruises to the dumpsite to gather data on the species present and to collect tissue samples for microconstituent analyses. The bibliography is included. (Sinha-OEIS)
W78-00320

OBSERVATIONS FROM THE DSRV ALVIN ON POPULATIONS OF BENTHIC FISHES AND SELECTED LARGER INVERTEBRATES IN AND NEAR DWD-106,
National Marine Fisheries Service, Washington, DC. Systematics Lab.
D. M. Cohen, and D. L. Pawson.
In: NOAA Dumpsite Evaluation Report 77-1, Baseline Report of Environmental Conditions in Deepwater Dumpsite 106, Vol 2, Biological Characteristics, p 423-450, June 1977. 2 fig, 16 tab, 9 ref.

Descriptors: *Waste disposal, *Fish populations, *Baseline studies, Water pollution effects, *Environmental effects, Invertebrates.
Identifiers: *Outer Continental Shelf, *Ocean dumping, Benthic fish.

The present report is based chiefly on nine submersible dives made to the bottom using DSRV ALVIN in or near DWD-106 during the period 25 July - 3 August, 1975. The benthic fish fauna of the DWD-106 area does not appear to be impacted by the present mode and amount of dumping. The decline with depth of overall population density and species diversity is a base-line feature. Patchiness of overall fish distribution and of particular species is also a base-line feature. (Sinha-OEIS)
W78-00322

EPIBENTHIC INVERTEBRATES,
National Marine Fisheries Service, Narragansett, RI. Atlantic Environmental Group.
C. Jones, and R. Haedrich.
In: NOAA Dumpsite Evaluation Report 77-1, Baseline Report of Environmental Conditions in Deepwater Dumpsite 106, Vol 2, Biological Characteristics, p 451-458, June 1977. 1 fig, 3 tab, 9 ref.

Descriptors: *Waste disposal, *Benthos, *Water pollution effects, *Baseline studies, *Environmental effects, Ecology, Invertebrates.
Identifiers: *Outer Continental Shelf, *Ocean dumping, *Epibenthic invertebrates, Ophiomusium lymani, Amphiphuira bullata.

Investigations of epibenthic invertebrate species composition, abundance and biomass were conducted as part of two cruises in the Northwest Atlantic ocean during the spring and fall of 1973. Trawl catches were analyzed for abundance and biomass. Species diversity and evenness were computed for the combined area. Patchiness was computed upon the frequency with which a species was present in the trawls. Complete species lists and cruise activities are listed. The faunal assemblage was dominated by echinoderms, with the ophiuroid, O. lymani as the dominant member of the community. In order, to predict the effects of future dumping on the epibenthic invertebrate community, detailed autoecological studies of the most dominant organisms and on-site epibenthic trawls at the dumpsite would be valuable. (Sinha-OEIS)
W78-00323

EPIFAUNAL MEGABENTHOS IN DWD 106,
Woods Hole Oceanographic Institution, MA.
G. T. Rowe, R. L. Haedrich, P. T. Polloni, and C. H. Clifford.
In: NOAA Dumpsite Evaluation Report 77-1, Baseline Report of Environmental Conditions in Deepwater Dumpsite 106, Vol 2, Biological Characteristics, p 459-464, June 1977. 2 tab, 6 ref.

Descriptors: *Benthos, Ecology, *Biomass, *Waste disposal, *Water pollution effects, *Baseline studies, *Environmental effects.
Identifiers: *Outer Continental Shelf, *Ocean dumping, Mid-Atlantic bight, Anemone, Cerianthus sp., Ophiomusium lymani.

During 1975 a series of ALVIN dives was made in DWD 106. Photographic transects were made across the bottom for the purpose of quantifying the abundance of the large invertebrates living on the bottom. The most prevalent species was the cosmopolitan ophiuroid Ophiomusium lymani. A major component of the biomass is the filter feeding, burrowing anemone Cerianthus sp., suggesting that considerable suspended matter, rich in organic matter, is available in the bottom water at DWD 106. Densities were not dissimilar, however, to those found off Massachusetts (Grassle et al., 1975), again suggesting there is little difference between DWD 106 and other regions of the slope and rise of the mid-Atlantic bight. (Sinha-OEIS)
W78-00324

FINAL REPORT ON BENTHIC INFAUNA OF DEEPWATER DUMPSITE 106 AND ADJACENT AREAS,
National Marine Fisheries Service, Highlands, NJ. Middle Atlantic Coastal Fisheries Center.
J. B. Pearce, J. V. Caracciolo, and F. W. Steimle, Jr.
In: NOAA Dumpsite Evaluation Report 77-1, Baseline Report of Environmental Conditions in Deepwater Dumpsite 106, Vol 2, Biological Characteristics, p 465-480, June 1977. 2 fig, 4 tab, 20 ref.

Descriptors: *Waste disposal, *Water pollution effects, *Baseline studies, *Environmental effects, *Industrial wastes, Benthos, Ecosystems.
Identifiers: *Outer Continental Shelf, *Ocean dumping.

Deepwater Dumpsite 106 (DWD 106) is located approximately 120 miles southeast of New York Harbor in depths exceeding 2000 meters. Since 1968, several industries in the New York-New Jersey area, including American Cyanamid and DuPont, have used this area as a repository for acid wastes, industrial chemicals and radioactive waste products. NOAA, in 1974, initiated a series of seasonal baseline investigations to assess the impact of previous dumping activities on the ecosystem of this area, and to serve as a basis against which future environmental change can be evaluated. This report represents a final analysis of the 1974 data and data obtained on the second DWD 106 survey conducted in February-March, 1976. Data show no significant differences in numbers of individuals, numbers of species or diversity in comparisons of stations within DWD 106 with control stations. Since stressed environments are often characterized both by low diversity and low concentrations of dissolved oxygen, there is, at this time, no reason to believe that toxic wastes disposed of at site 106 have impinged upon the fauna collected at sampling sites. With continued dumping and degradation of this toxic material, there is a possibility of development of a stress situation in the future. (Sinha-OEIS)
W78-00325

NEUSTON FISH AT DWD 106,
Woods Hole Oceanographic Institution, MA.
R. Haedrich.
In: NOAA Dumpsite Evaluation Report 77-1, Baseline Report of Environmental Conditions in Deepwater Dumpsite 106, Vol 2, Biological Characteristics, p 481-485, June 1977. 2 tab.

Descriptors: *Waste disposal, *Baseline studies, *Environmental effects, *Water pollution effects, *Bioindicators, Fish, Ecology.
Identifiers: *Outer Continental Shelf, *Ocean dumping, Lanternfish, Myctophids, Chronic effects.

Certain myctophids (Lanternfish) are of particular interest in potentially polluted oceanic areas because they migrate vertically from a daytime depth of a thousand or more meters to the surface layer each night to feed. Since they must pass through the polluted waters, data concerning numbers, length, and sex of individuals, in comparison with the same data from unpolluted areas, should indicate chronic effects of dumping upon the population. No significant differences were seen in total neuston fish catches within and outside the dumpsite. However, mesopelagic fish appeared more abundant outside the dumpsite. Since 'within' and 'outside' were determined only geographically, these observations must be interpreted with care. The highest rate of fishless tows occurred on the night after a dump. There is considerable ambiguity in the situation, however, as it is not known whether the tows were still in waters affected by the dumped material. (Sinha-OEIS)
W78-00326

A SUMMARY OF THE INPUT OF INDUSTRIAL WASTE CHEMICALS AT DEEPWATER DUMPSITE 106 DURING 1974 AND 1975,
National Marine Fisheries Service, Narragansett, RI. Atlantic Environmental Group.
For primary bibliographic entry see Field 5B.
W78-00327

FINAL REPORT ON HEAVY METALS IN SMALL PELAGIC FINFISH, EUPHAUSID CRUSTACEANS AND APEX PREDATORS, INCLUDING SHARKS, AS WELL AS ON HEAVY METALS AND HYDROCARBONS (C15+) IN SEDIMENTS COLLECTED AT STATIONS IN AND NEAR DWD 106,
National Marine Fisheries Service, Milford, CT. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 5B.
W78-00330

APPENDIX, (NOAA DUMPSITE EVALUATION REPORT),
National Marine Fisheries Service, Washington, DC. National Systematics Lab.
For primary bibliographic entry see Field 5E.
W78-00331

SCOPE FOR METABOLISM AND GROWTH OF SOCKEYE SALMON, ONCORHYNCHUS NERKA, AND SOME RELATED ENERGETICS,
Fisheries and Marine Service, Nanaimo (British Columbia). Biological Station.
J. R. Brett.
Journal of the Fisheries Research Board of Canada, Vol. 33, p 307-313, 1976. 3 fig, 2 tab, 25 ref.

Descriptors: *Environmental effects, *Temperature, *Metabolism, Salmon, Growth rates, Feeding, Energy budget.

The concept of scope for activity was developed as the difference between active and standard metabolic rates. Metabolic and feeding requirements of fingerling sockeye salmon are compared over a range of temperatures from 1-24C. The relation that these requirements bears to temperature shows that the energy of standard metabolism amounts to approximately two thirds of the maintenance requirement at 1C, falling to one third at 23C. The active metabolic rate of sockeye was seen to rise exponentially with increasing temperature up to 15C where in levels off, decreasing slightly at higher temperatures. It was concluded that a simple means for determining growth scope is afforded from ration measurements, and that the general scope for activity concept is supported in the fashion that Fry first eleborated in 1947. (Chilton-ORNL)
W78-00332

SEASONAL RESPIRATORY VARIATION AND ACCLIMATION IN THE PEA CLAM, PISIDIUM WALKERI STERKI,
Case Western Reserve Univ., Cleveland, OH. Dept. of Biology.
A. J. Burky, and K. A. Burky.
Comparative Biochemistry and Physiology, Vol. 55A, p 109-114, 1976. 2 fig, 1 tab, 29 ref.

Descriptors: *Environmental effects, *Seasonal, Respiration, *Clams, Temperature, Size.
Identifiers: Biological activity, Oxygen consumption, Pea clams.

Seasonal respiratory variation is presented for field acclimated clams at field temperatures and at experimental temperatures of 10 and 20C. The oxygen consumption rates were computed in terms of shell-free tissue weight and shell-free tissue nitrogen. As field temperatures rose above 10C, an inverse relationship between respiration and temperature was observed. Data showed that seasonal acclimation of early spring indicates over-compensation for the over-wintering generation and the summer-fall data indicates reverse acclimation for the summer generation. No size-rate differences were observed for measurements of oxygen consumption. Information on seasonal respiratory variation and acclimation to temperature by ectotherms under natural conditions is identified as the best indication of the activity level of organisms in relation to their biological and physical environments. (Chilton-ORNL)
W78-00333

THERMAL TOLERANCE AND RESISTANCE OF THE NORTHERN ANCHOVY, ENGRAULIS MORDAX,
University of Southern California, Los Angles. Allan Hancock Foundation.
G. D. Brewer.
Fishery Bulletin, Vol. 74, No. 2, 1976. p 433-445, 10 fig, 4 tab, 48 ref.

Descriptors: *Environmental effects, *Thermal pollution, Temperature, Resistance, Mortality.
Identifiers: *Anchovy, Tolerance, Thermal tolerance, Acclimation temperature.

The study, prompted by proposed discharge of thermal effluent into Los Angeles-Long Beach Harbor, details aspects of thermal tolerance and resistance of the embryo, larval, juvenile, and adult stages of the northern anchovy. Experimentally determined upper lethal temperature was 29.5C. Acclimation temperatures of 24C and above had little effect on increasing the incipient upper lethal temperature. Experiments on the resistance of juvenile and adult anchovy to high lethal temperatures showed no significant difference in the mean resistance times for fish of different sizes or for fish maintained under different photoperiods. Females were found to be more resistant than males and animals tested in the morning showed greater resistance than those tested in the evening. Larvae held at temperatures below 11C for short periods became inactive. Normal development was inhibited below 11.5C and above 27.0C. Growth in the yolk-sac stage was maximal between 14 and 20C. Regardless of acclimation temperature, all stages of anchovy can endure sudden temperature increases and decreased between limits of 14.5 and 23.0 without significant lethality from direct temperature effects alone. (Chilton-ORNL)
W78-00335

THE FEEDING BEHAVIOR OF MYTILUS EDULIS IN THE PRESENCE OF METHYLMERCURY ACETATE,
Texas A and M Univ. College Station. Dept. of Biology.
P. Dorn.
Bulletin of Environmental Contamination and Toxicology, Vol 15, No 6, 1976. p 714-719, 1 fig, 2 tab, 19 ref.

Descriptors: *Environmental effects, *Water pollution effects, Toxicity, *Mercury, *Mussels, *Feeding rates.

Experimental animals, Mytilus edulis, were held at 12C and 29% salinity. C14 labelled diatoms were fed to Mytilus in concentrations of 0.4, 0.8, 1.2, 1.6, 2.0 and 2.8 mg/l methyl mercury acetate. Control animals showed that mussels are capable of ingesting and retaining 145-34,045 diatom cells/day. All concentrations of methyl mercury resulted in decreased feeding. This decrease in feed was related to physiological stress. It was suggested that decreased feeding may be caused by disruption of ciliary activity. (Chilton-ORNL)
W78-00338

OXYGEN PRODUCTION-CONSUMPTION OF THE PELAGIC SARGASSUM COMMUNITY IN A FLOW-THROUGH SYSTEM WITH ARSENIC ADDITIONS,
University of South Florida, St. Petersburg. Dept. of Marine Science.
N. J. Blake, and D. L. Johnson.
Deep-Sea Research, 1976, Vol. 23. p 773-778, 3 fig, 1 tab, 14 ref.

Descriptors: Environmental effects, *Water pollution effects, *Arsenic, *Oxygen, Productivity, Respiration, Metabolism.
Identifiers: *Sargassum.

Preliminary results of productivity, respiration, and arsenic species transformation measurements of the Sargassum community in a maintained flow-through system are presented. Net production ranged from 0.14 to 0.76 mg 02/g/h and respiration from 0.22 to 0.86 ml 02/g/h. It was shown that respiration is not constant under complete darkness. Although net production was fairly symmetrical about the mid-point of apparent local noon, respiration soon after sunset was twice that just before sunrise. Arsenic additions did not result in any measurable effect upon the metabolism of the community. More As(III) was observed in the outflow than was present in the inflow within 3 h after the addition of the arsenic solution had begun. Total arsenic into the system balanced total arsenic in the outflow. It was not substantiated whether the production of As(III) resulted from immediate reduction of As(V) in the inflow or represented exchange of As(V) for As(III) in the biological reservoir of the community. When the steady-state distribution of arsenic chemical species was altered, there was a relatively rapid system response in the direction of re-establishing the ambient As(III)/As(V) distribution ratio. (Chilton-ORNL)
W78-00342

EFFECTIVENESS OF TRITIUM AND PU 239 IN PRODUCING CHROMOSOME ABERRATIONS IN CHIRONOMUS RIPARIUS,
Oak Ridge National Lab., TN. Environmental Sciences Div.
B. G. Blaylock, and J. R. Trabalka.
Report IAEA-SM-202/302, 1976. 6 p. In: Biological and Environmental Effects of Low-Level Radiation. Vol. II. p 45-50, 1 tab, 10 ref.

Descriptors: Environmental effects, *Genetics, *Chromosomes, *Plutonium, *Tritium, Irradiation, Larvae, Radioisotopes, Diptera.
Identifiers: *Chironomus riparius.

The purpose of the study was to compare the frequency of chromosome aberrations produced in the salivary gland chromosomes of Chironomus riparius by the low-energy beta rays from tritum with those produced by the alpha radiation from Pu 239. Fl larvae showed aberrations in cases where their progenitors had developed in concentrations of 30, 125, and 250 microCi/mlitre of tritiated water. The frequency of these aberrations was approximately the same as the frequency produced by an equivalent dose of chronic external gamma radiation. No aberrations were observed in Fl larvae from 0.02 microCi/mlitre concentrations of Pu 239. The lowest calculated dose at which aberrations were detected for tritiated water was 180 rads while the dose calculated for the Pu 239 concentration of 0.02 microCi/mlitre was 120 rads. It was concluded that these preliminary data do not support a high relative biological effectiveness for chromosome aberrations produced in the gonads of Chironomus exposed to chronic irradiation from Pu 239. (Chilton-ORNL)
W78-00343

DISSOLVED AND PARTICULATE TRACE METALS IN THE RHINE ESTUARY AND THE SOUTHERN BIGHT,
Nederlands Inst. voor Onderzoek der Zee, Texel.
For primary bibliographic entry see Field 5B.
W78-00344

METHYLMERCURY IN A FRESHWATER FOODCHAIN,
Oak Ridge National Lab., TN. Environmental Sciences Div.
J. W. Huckabee, R. A. Goldstein, S. A. Janzen, and S. E. Woock.
In: International Conference on Heavy Metals in the Environment, Toronto, Ontario, Canada, October 27-31, 1975. p 199-216, 6 fig, 1 tab, 26 ref.

Descriptors: Environmental effects, *Water pollution effects, Heavy metals, *Mercury, Fish, *Food chains, Absorption, Zooplankton, Daphnia.
Identifiers: *Methylmercury, Body burden.

To assess the relative importance of mercury uptake from ambient water and mercury uptake from food, a series of tests were conducted with the natural foodchain Daphnia pulex and Gambusia affinis. It was found that zooplankton accumulate methlmercury at least 10-15 times faster than fish but that a similar relationship does not hold true for elimination rates. Ingestion of mercury contaminated food accounted for less than 15% of the zooplankton uptake. For the fish, the relative importance of the ambient water and the food chain was mostly a function of ingestion rate indicating that the food chain can be a contributor to methylmercury body burden in mosquito fish. (Chilton-ORNL)
W78-00346

PROBLEMS IN ESTABLISHING THE RELATIONSHIP BETWEEN PUMPING RATE AND OXYGEN CONSUMPTION RATE IN THE HARD CLAM, MERCENARIA MERCENARIA,
Oak Ridge National Lab., TN. Environmental Sciences Div.
W. Van Winkle.
Comparative Biochemistry and Physiology, Vol. 50A, 1975, p 657-660, 1 fig, 2 tab, 11 ref.

Descriptors: Biology, Biochemistry, *Oxygen demand, *Oxygen requirements, *Clams.
Identifiers: Mercenaria mercenaria, Pumping rate, Gills.

Data and a line of reasoning are presented to indicate the problems concerning pumping rate and oxygen consumption on the basis of pumping-rate measurements and external, oxygen-concentration measurements alone. The author presents an analysis of two possibilities for gill tissue oxygen consumption rate relative to total oxygen consumption oxygen rate following an increase in total oxygen consumption rate from an average rate where gill tissue account for 20% of the total. The need for more direct physiological evidence (simultaneous measurements of pumping rate, external oxygen levels and blood oxygen levels) indicating whether or not pumping rate is dependent upon oxygen requirements is expressed. (Chilton-ORNL)
W78-00348

PREFERENTIAL ADSORPTION OF CS137 TO MICACEOUS MINERALS IN CONTAMINANTED FRESHWATER SEDIMENT,
Oak Ridge National Lab., TN. Environmental Sciences Div.
C. W. Francis, and F. S. Brinkley.
Nature, Vol. 260, No. 5551, April 1976, p 511-513, 2 fig, 13 ref.

Descriptors: Environmental effects, *Adsorption, *Cesium, Freshwater, *Sediments, Particle size, Cycling, Kaolinite, Quartz, Radioisotopes, Water pollution.
Identifiers: Preferential adsorption, Density gradient.

Sediment particles, containing predominately kaolinite and quartz, were fractionated by density-gradient centrifugation in a large scale zonal rotor. A decreasing Cs137 concentration with increasing particle density was observed. This was attributed to an increasing concentration of quartz. The highest Cs137 concentration was observed in the density fraction whose major mineral was kaolinite. More than 80% of the total Cs137 burden was associated with this fraction. It was concluded that the consequence of selective adsorption of cesium to cesium-fixing minerals in environmental conditions strongly influences the availability of Cs137 cycling to the biotic component of a particular ecosystem. (Chilton-ORNL)
W78-00349

THERMAL EFFECTS, (LITERATURE REVIEWS),
Oak Ridge National Lab., TN. Environmental Sciences Div.
C. C. Coutant, and S. S. Talmadge.
Journal Water Pollution Control Confederation, Vol. 49, June 1977, p 1369-1425, 10 tab, 610 ref.

Descriptors: Environmental effects, *Thermal pollution, Temperature, Aquatic life, *Water pollution effects, Reviews, *Bibliographies.
Identifiers: *Literature reviews.

The report is a literature review of 1976 research and biological concerns relating to the effects of temperature on aquatic organisms. 610 references are listed. Text presents papers of interest which were given at symposia during the year. Attention is given to studies involving siting of power plants, producers (effects of temperature on growth and production, community responses) consumers (reproduction, development, morphology, distribution, temperature tolerance, growth, feeding and digestion, temperature and other stresses, temperature selection and avoidance, activity, and predator-prey relations), decomposers, diseases and parasites, and beneficial uses. (Chilton-ORNL)
W78-00352

EFFECTS OF TEMPERATURE ON FOOD INGESTION RATE AND ABSORPTION, RETENTION, AND EQUILIBRIUM BURDEN OF PHOSPHORUS IN AN AQUATIC SNAIL, GONIOBASIS CLAVAEFORMIS LEA,
Oak Ridge National Lab., TN. Environmental Sciences Div.
J. W. Elwood, and R. A. Goldstein.
Freshwater Biology, Vol. 5, 1975, p 397-406, 5 fig, 1 tab, 22 ref.

Descriptors: Environmental effects, *Temperature, *Feeding rates, *Phosphorus, *Absorption, Retention, *Snails, Aquatic animals.
Identifiers: Equilibrium burden.

Feeding rates of Goniobasis clavaeformis Lea were measured at 10, 13.8, 15, and 19.3C and the effects of sublethal temperatures on feeding rates and phosphorus dynamics were determined. Feeding rate was observed to increase with increasing temperature up to 14C and to decrease above 14C. Elimination rate of absorbed phosphorus increased with increasing temperatures to 19.3C. Mean retention time of phosphorus in the gut showed the same temperature relationship as that of ingestion rate. The equilibrium body burden of the snail was maximum between 11 and 12C and decreased at temperatures above 12C. The comparatively low absorption efficiency of phosphorus over the range of experimental temperatures indicates that this species does not have a total compensatory mechanism for maintaining a constant equilibrium load as temperature increases. (Chilton-ORNL)
W78-00353

TEMPERATURE PREFERENCE STUDIES IN ENVIRONMENTAL IMPACT ASSESSMENTS: AN OVERVIEW WITH PROCEDURAL RECOMMENDATIONS.
American Fisheries Society, Bethesda, MD.
Journal of the Fisheries Research Board of Canada, Vol. 34, p 728-761, 224 ref. The Proceedings of a Symposium and Panel Discussion held at the Northeast Fish and Wildlife Conference, Hershey, Pa., April 27, 1976. Richards, F. P., Reynolds, W. W., and McCauley, R. W. (eds).

Descriptors: *Environmental effects, *Thermal pollution, Temperature, *Conferences, Assessments, Aquatic life, Water pollution.
Identifiers: Temperature preference(Aquatic life).

The symposium was intended to serve as a primer for those unfamiliar with temperature preference studies and as a source of up-to-date information for those actively working in the field. The proceedings includes five formal papers which cover the basic areas of physiological responses to changing temperature, theoretical background of behavioral responses to temperature, a tabulation of published results, application of these results to impact assessments, and a review of laboratory apparatuses and methodologies. Bibliographies have been collated to eliminate redundancy and to provide easy reference. Comments from a panel discussion have been edited and are paraphrased in the proceedings. (See W78-00355 thru W78-00359) (Chilton-ORNL)
W78-00354

PHYSIOLOGICAL AND BEHAVIORAL REACTIONS OF FISHES TO TEMPERATURE CHANGE,
John B. Pierce Foundation Lab., New Haven, CT.
L. I. Crimshaw.
Journal of Fisheries Research Board of Canada, Vol. 34, 1977, p 730-734, 2 fig.

Descriptors: *Environmental effects, *Thermal pollution, Temperature, *Fish behavior, Fish physiology, Water pollution effects.
Identifiers: Acclimation, Temperature regulation.

Data indicates that there is an underlying similarity between the central nervous system mechanisms regulating body temperature in all vertebrates. Both physiological and behavioral thermoregulatory mechanisms are similarly controlled in that peripheral and anterior brainstem temperatures are integrated to produce a restorative response of appropriate direction and magnitude. There are indications that behavioral tempeature regulation is similar in fish and mammals, in terms of accuracy and underlying control mechanisms but that this is not true for physiological responses. In teleost fishes, short-term deviations from ambient temperatures are seen to alter respiratory requirements, produce acid-base imbalance, and cause disturbances in fluid-electrolyte regulation. Acclimation to given temperatures tends to bring about changes that counteract these disturbances. (See also W78-00354) (Chilton-ORNL)
W78-00355

SUMMER STREAM METABOLISM VALUES FOR CEDAR CREEK, KANSAS,
Emporia Kansas State Coll. Dept. of Biology.
C. W. Prophet, and J. D. Ransom.
Southwest Nat. 19(3), p 305-308, 1974.

Descriptors: *Metabolism, Streams, *Kansas, Summer, *Primary productivity, Biological communities, *Respiration, Oxygen, Estimating.
Identifiers: *Oxygen change method, *Cedar Creek(Kan).

Summer gross primary productivity and community respiration along Cedar Creek in Chase County, Kansas, were estimated by the daily oxygen change method. Mean gross primary productivity increased from upstream to downstream while the opposite trend was true for community respiration. Observed daily gross primary productivity varied from less than 1.0-32.3 gO2/m2/day and community respiration varied from 5.52-26.4 g O2/m2/day.--Copyright 1975, Biological Abstracts, Inc.

W78-00359

ACUTE TOXICITY OF AMMONIA-BASE NEUTRAL SULFITE PULP MILL WASTE LIQUOR TO RAINBOW TROUT,
Rollins Animal Disease Diagnostic Lab., Raleigh, NC.
J. M. Griffin, and J. L. West.
Bulletin of Environmental Contamination and Toxicology, Vol. 15, No. 5, p 608-612, May, 1976. 11 ref, 1 tab.

Descriptors: *Fish, *Pulp wastes, *Toxicity, *Water pollution effects, Wastes, Industrial wastes, Water pollution sources, *Bioassay, Ammonia, Pulp and paper industry, Effluents, Lignins, Specific gravity, Sulfur compounds, Biochemical oxygen demand, Hydrogen ion concentration, Lethal limit, Sulfite liquors.
Identifiers: *Spent sulfite liquors, Sulfur dioxide.

In laboratory static bioasays, the mean LC(50) for fingerling rainbow trout of ammonia-base spent sulfite liquor was 0.82%. Ammonia concentration ranged from 0.5 to 9.0 mg/liter, and was highest on the first day, decreasing on the second and third days, and increasing again on the fourth day. Regression analysis indicated high correlation between 5 of 8 spent liquor constituents and LC(50). The lignin content correlated most highly with LC(50), followed by specific gravity, sulfur dioxide, ammmonia, and BOD. Transmittance, pH, and filterable solids did not correlate with LC(50). (Speckhard-IPC)
W78-00363

QUALITY OF EFFLUENTS FROM VARIOUS MECHANICAL PULPING PROCESSES,
Pulp and Paper Research Inst. of Canada, Pointe Claire (Quebec).
For primary bibliographic entry see Field 5B.
W78-00368

TOXICITY OF PULP AND PAPER MILL EFFLUENTS,
British Columbia Research Council, Vancouver.
C. C. Walden, T. E. Howard, and J. C. Mueller.
Canadian Pulp and Paper Association, Annual Meeting (Montreal), 1976, Preprints, p 217-227B. 1 fig, 63 ref, 2 tab.

Descriptors: *Pulp wastes, *Toxicity, Effluents, Pulp and paper industry, Foreign countries, Canada, Wastes, Industrial wastes, Water pollution sources, Bleaching wastes, Fish, Aquatic life, Activated sludge, Oxidation lagoons, Foam fractionation, Waste water treatment, Water pollution treatment, Waste treatment, Water pollution control.

The construction of three pulp mills in the Fraser River watershed (Canada) during the 1960's prompted toxicity studies of Canadian pulp and paper mill discharges. Acute toxicity of most pulp mill effluents to aquatic fauna has been documented. Continuing studies are confirming the additive nature of toxic loads within the bleach plant. Compounds in pulp mill effluents that are toxic to fish are tabulated and discussed. Substantial efforts have been made in assessing the effluent concentration below which no stress is exerted on aquatic organisms. The evidence gathered over the last 10-15 years indicates that this concentration is about 0.05-0.10 of the 96-hr LC(50) values. Two of the mills installed extended activated sludge systems and the third an aerated stabilization basin. Detoxification by the stabilization basins was more consistent than by the two activated sludge systems, and the two mills with the activated sludge systems have converted them to aerated stabilization basins. Foam fractionation for detoxifying mill effluents is also being considered. (Witt-IPC)
W78-00369

LONG-TERM EFFECTS OF REPEATED LOGGING ON AN APPALACHIAN STREAM,
Northeastern Forest Experiment Station, Parson, WV.
For primary bibliographic entry see Field 4C.
W78-00376

HEAVY METALS IN THE DERWENT ESTUARY,
Tasmania Univ., Hobart. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W78-00393

BIOLOGICAL TRANSPORT OF ZINC-65 INTO THE DEEP SEA,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 5B.
W78-00395

LIMING: AN OVERESTIMATED METHOD FOR PREVENTING THE SPREAD OF THE CRAYFISH PLAGUE,
Uppsala Univ. (Sweden). Inst. of Physiological Botany.
K. Svensson, K. Soderhall, T. Unestam, and B. -O. Andersson.
Institute of Freshwater Research, Drottningholm report No 55, p 132-135, 1977. 1 fig, 3 tab, 3 ref.

Descriptors: *Crayfish, *Lime, *Calcium compounds, *Animal diseases, *Pathogenic Fungi, *Fungicides, Animal physiology, Animal pathology, Crustaceans, Invertebrates, Toxicity, Resistance, Laboratory tests, Bioassay, Aquiculture, Lethal limit.
Identifiers: *Crayfish plague, Astacus astacus, Aphanomyces astaci, *Slaked lime.

The lethal effect of liming with slaked lime, Ca(OH)2, on the crayfish, Astacus astacus L., was studied. It was obvious from both laboratory and field experiments that this method had little or no effect on the animals unless saturated solutions were used. A long exposure in an aquarium about 16 hours at pH values above 11.5 was required to kill the total crayfish population. In a natural environment, a small crayfish stream, such conditions do not occur unless water flow is extremely slow. Recommendations were given on how to apply liming in order to limit the spread of the crayfish plague. (Klein)
W78-00396

MERCURY LEVELS IN BIOTA FROM MORRUM RIVER DURING A 10 YEAR CLEAN-UP PERIOD,
Naturhistoriska Riksmuseet, Stockholm (Sweden). Section for Invertebrate Zoology.
For primary bibliographic entry see Field 5B.
W78-00397

CORTICOID STRESS RESPONSE TO HANDLING AND TEMPERATURE IN SALMONIDS,
Oregon Cooperative Fishery Research Unit, Corvallis.
R. J. Strange, C. B. Schreck, and J. T. Golden.
Transactions of the American Fisheries Society, Vol. 106, No. 3, p 213-218, 1977. 5 fig, 34 ref.

Descriptors: *Salmonids, *Temperature, *Fish physiology, Cutthroat trout, *Chinook salmon, Juvenile growth stage, Resistance, Thermal stress, Fish behavior, Laboratory tests, Water temperature, Biochemistry.
Identifiers: *Corticoid stress response, *Plasma corticoid levels.

Plasma corticoid concentrations in juvenile chinook salmon netted and confined in a small livecage rose from approximately 100 ng/ml to about 500 ng/ml in 24-h, then fell to 250 ng/ml at 48h. In juvenile chinook salmon dip netted into a bucket containing aerated water and sampled serially at 90-s intervals, plasma corticoids increased from less than 10 ng/ml to approximately 100 ng/ml in 20 min. In juvenile cutthroat trout acclimated to 13C and subjected to rapid increase in water temperature to 26C, plasma corticoid concentration increased from about 20 ng/ml to 70 ng/ml in 25 min. and remained elevated for more than 3 h. Juvenile cutthroat trout acclimated to diurnal temperature cycles (13-23C) had no substantial changes in plasma corticoid concentration throughout the cycles. Juvenile cutthroat trout acclimated to 23C had the same initial corticoid concentration as the cutthroat trout acclimated to 9C. When both groups were subjected to identical netting and confinement, the corticoid concentrations in fish from the two temperatures responded in a similar fashion until 70 min of confinement when trout from the warmer water failed to maintain increasing corticoid concentrations. (Klein)
W78-00398

DISTRIBUTION AND TEMPERATURE ADAPTATION IN THE TELEOST FISH GENUS GIBBONSIA,
San Francisco State Univ., CA. Dept. of Biology.
For primary bibliographic entry see Field 5B.
W78-00399

LABORATORY DETERMINATION OF ACUTE AND SUBLETHAL TOXICITIES OF INORGANIC CHLORAMINES TO EARLY LIFE STAGES OF COHO SALMON (ONCORHYNCHUS KISUTCH),
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
G. L. Larson, F. E. Hutchins, and L. P. Lamperti.
Transactions of the American Fisheries Society, Vol. 106, No. 3, p 268-275, 1977. 6 fig, 2 tab, 19 ref.

Descriptors: *Toxicity, *Inorganic compounds, *Chlorine, *Salmonids, *Growth stages, *Growth rates, Mortality, *Coho salmon, Resistance, Path of pollutants, Juvenile life stage, Temperature, Salinity, Water quality, *Lethal limit.
Identifiers: *Inorganic chloramines, Bioaccumulation, Toxicants.

The 96-h TL50 was shown to vary according to the life stage of coho salmon studied. The most sensitive stage was just after the fry stage. Temperature and alkalinity did not affect acute toxicity. Acute toxicity was not affected by pH 7.0 and 7.5, but increased at pH 8.1. Continuous exposure to inorganic chloramine concentrations up to 47 micro g/liter did not affect the survival, development, or hatching ability of coho salmon embryos. Alevins exposed to 23 and 47 micro g/liter of toxicant exhibited lethargic behavior shortly after hatch. All of the alevins exposed to 47 micor g/liter chloramines died within 9 weeks after hatch. In the other test groups little mortality occurred that could be attributed to the toxicant. Growth of alevins exposed to 23 and 47 micro g/liter was reduced as compared to that of the controls. Although the alevins exposed to 47 micro g/liter died, those exposed to 23 micro g/liter chloramines reached the fry stage. Attainment of this development stage was delayed and possible ecological consequences of such delays were discussed. Growth of juveniles was reduced at 22-23 micro g/liter chloramines. The threshold for reduction of growth occurred between 11 and 22-23 micro g/liter, but this was probably influenced by fish size, history of exposure to the toxicant, and the age-season comples. (Klein)
W78-00400

THE EFFECTS OF INTERMITTENT CHLORINATION ON RAINBOW TROUT AND YELLOW PERCH,
Wisconsin Univ.-Milwaukee. Dept. of Zoology; and Wisconsin Univ.-Milwaukee. Center for Great Lakes Studies.
A. S. Brooks, and G. L. Seegert.

Transactions of the American Fisheries Society, Vol. 106, No. 3, p 278-286, 1977. 1 fig, 4 tab, 19 ref.

Descriptors: *Chlorine, *Chlorination, *Toxicity, *Mortality, *Rainbow trout, Resistance, *Yellow perch, Salmonids, Perches, Water quality, Laboratory tests, Design, Lethal limit, Bioassay, Thermal stress, Thermal water, Water temperature.

Rainbow trout and yellow perch were exposed to residual chlorine for single 30-minute and triple 5-minute doses. Tests were conducted at 10, 15, and 20C with both species plus 25 and 30C for the perch. Single exposure 30-minute LC50 values for the perch ranged from 0.70 mg/liter at 30C to 8.0 mg/liter at 10C. Triple 5-minute exposure LC50 values for the perch were 22.6 and 9.0 mg/liter at 10 and 20C, respectively. Two groups of trout tested at 20C yielded 30-minute LC50 values of 0.60 and 0.43 mg/liter. Triple exposure 5-minute LC50 values for the trout were 2.87 mg/liter at 10C and 1.65 mg/liter at 20C. Mortality occurred immediately after exposure to chlorine in the 30-minute perch tests at 10 and 15C, but was delayed 2-12 hours at the higher temperautres. This pattern was reversed in the 5-minute triple exposure tests, Rainbow trout exhibited rapid mortality in all tests except the 10C triple exposure series where mortality was delayed 12-24 hours. For both species, concentrations resulting in no mortality were approximately one-half the LC50 value. (Klein)
W78-00401

ACUTE TOXICITIES OF SELECTED HERBICIDES TO FINGERLING CHANNEL CATFISH, ICTALURUS PUNCTATUS,
Mississippi State Univ., Mississippi State. Dept. of Zoology.
F. M. McCorkle, J. E. Chambers, and J. D. Yarbrough.
Bulletin of Environmental Contamination and Toxicology, Vol 18, No. 3, p 267-270, 1977. 1 tab, 7 ref.

Descriptors: *Toxicity, *Herbicides, *Chlorinated hydrocarbon, *Pesticides, *Toxins, *Catfishes, *Channel catfish, *Organic compounds, Mortality, 2,4-D, 2,4,5-T, Monuron, Dalapen, Immature growth stage, Endrin, Laboratory tests, Metabolism.
Identifiers: Bioaccumulation, Alanap, Chloramben, Diuron, DSMA, EPTC, Fluometuron, Metribuzin, MSMA, Nitralin.

A scan of the acute toxicities of eighteen common herbicides to one-year-old channel catfish (Ictalurus punctatus) was conducted. Herbicides causing less than 10% mortality in 48 hr at 10 ppm were: alanap, chloramben, 2,4-D acid, 2 , D dimethyl amine salt, dalapon, diuron, DSMA, EPTC, fluometuron, metribuzin, monuron, MSMA, nitralin, and 2,4,5-T. The 96-hr LC50 values in ppb for four herbicides found toxic were: propanil, 3796; trifluralin, 417; bensulide, 379; and DNBP, 118. The toxicity of Dyanap, a mixture of DNBP and alanap, was lower than that of DNBP; there was no apparent synergism between DNBP and alanap in the mixture. (Klein)
W78-00402

EFFECTS AND UPTAKE OF CHLORINATED NAPHTHALENES IN MARINE UNICELLULAR ALGAE,
Environmental Research Lab., Gulf Breeze, FL.
G. E. Walsh, K. A. Ainsworth, and L. Faas.
Bulletin of Environmental Contamination and Toxicology, Vol. 18, No. 3, p 197-302, 1977. 2 tab, 15 ref.

Descriptors: *Chlorine, *Organic compounds, *Industrial wastes, *Toxicity, *Productivity, *Algae, Path of pollutants, Mode of action, Metabolism, Ecosystems, Food chains, Oil industry, Environmental effects, Absorption, *Bioassays.
Identifiers: *Chlorinated naphthalenes, Bioaccumulation, Chlorine content.

A chlorinated haphthalene formulation that contained a mixture of mono- and dichloro isomers was more toxic to marine algae than were formulations of tri-, tetra-, penta-, and hexachloro isomers. However, uptake was directly related to chlorine content. The penta- and hexachloronaphthalenes are generally the most toxic to animals, and if algae were exposed to these compounds in nature, it is possible that they could serve as vehicles for transfer to aquatic animals. Transfer through food webs could begin with algae and result in effects at higher trophic levels. (Klein)
W78-00403

CONCENTRATION OF CADMIUM, COPPER, LEAD, AND ZINC IN THIRTY-FIVE GENERA OF FRESHWATER MACROINVERTEBRATES FROM THE FOX RIVER, ILLINOIS AND WISCONSIN,
Northern Illinois Univ., DeKalb. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5B.
W78-00404

INVESTIGATIONS INTO THE ACUTE TOXICITY AND SOME CHRONIC EFFECTS OF SELECTED HERBICIDES AND PESTICIDES ON SEVERAL FRESH WATER FISH SPECIES,
Marist Col., Poughkeepsie, NY. Environmental Science Program.
R. E. Rehwoldt, E. Kelley, and M. Mahoney.
Bulletin of Environmental Contamination and Toxicology, Vol. 18, No. 3, p 361-365, 1977. 4 tab, 7 ref.

Descriptors: *Freshwater fish, *Organophosphorous compounds, *Chlorinated hydrocarbon pesticides, *2,4-D, *Toxicity, *2,4,5-T, *Organic compounds, Path of pollutants, Metabolism, Fish physiology, Fish reproduction, Striped bass, Carp, Eels, White perch, *Herbicides, Bioassay, Laboratory test, *Aldrin.
Identifiers: Bioaccumulation, Tissue analysis, *Malathion, *Methyl parathion, Banded killyfish, Pumkinseed, Guppy, Acetylcholinesterase.

Chronic exposure to 2,4-D or 2,4,5-T to striped bass, carp, guppy, banded killyfish, pumpkinseed, white perch and the American eel resulted in no observable physiological sysmptoms, nor was any raising of the toxic level in these fish shown. TLm values were not significantly different after exposure to sub-lethal amounts of these reagents. No substantial differences in weight/time relationships between the exposed fish and the control fish were demonstrated. Chronic exposure to the organophosphorous compounds resulted in substantial reductions fo brain acetylcholinesterase levels. Guppies were used in breeding experiments. (Klein)
W78-00405

PARALYTIC SHELLFISH POISONING IN TENAKEE, SOUTHEASTERN ALASKA: A POSSIBLE CAUSE,
National Marine Fisheries Service, Auke Bay, AK. Auke Bay Lab.
S. T. Zimmerman, and R. S. McMahon.
Fishery Bulletin, Vol. 74, No. 3, p 679-680, 1976. 11 ref.

Descriptors: *Productivity, *Pathology, *Animal diseases, *Human diseases, *Toxicity, *Shellfish, *Clams, *Mussels, Mode of action, Population, Invertebrates, Environmental effects, *Alaska, Bioluminescence, Public health, Protozoa.
Identifiers: *Gonyaulax catenella, *Paralytic shellfish poisoning, Bioaccumulation, Tissue analysis, S. giganteus, M. edulis, Marine protozoa.

A localized Gonyaulax catenella bloom followed by a paralytic shellfish poisoning (PSP) outbreak in Alaskan waters was investigated. High levels of toxin were found in the butter clam and the mussel after a high bioluminescence (of which G. catenella was found in a high population) was seen and subsequent shellfish poisoning in humans was reported. Toxin filtering and containing rates were measured in the butter clam. According to background events, shellfish toxication just prior to illnesses was indicated. The occurrence of the G. catenella bloom approximately 1 week before the PSP outbreak indicated that although this species is normally found in low densities in Alaska, it can occur in high enough numbers to rapidly toxify clams. (Klein)
W78-00406

EFFECT OF NO. 2 FUEL OIL AND SOUTH LOUISIANA CRUDE OIL WATER-SOLUBLE FRACTIONS ON HEMOGLOBIN COMPENSATION AND HYPOXIA TOLERANCE IN THE POLYCHAETOUS ANNELID, NEANTHES ARENACEODENTATA (MOORE),
Scripps Institution of Oceanography, La Jolla, CA. Marine Biology Research Div.
S. S. Rossi, and J. W. Anderson.
Marine Science Communications, Vol 3, No 2, p 117-131, 1977. 2 fig, 1 tab, 15 ref.

Descriptors: *Organic compounds, *Toxicity, *Fuels, *Oil wastes, *Oil pollution, *Worms, Animal physiology, Path of pollutants, Mortality, Lethal limit, Dissolved oxygen, Respiration, Laboratory tests, Resistance.
Identifiers: *No. 2 Fuel Oil, *South Louisiana crude oil, Hemoglobin compensation, Hypoxia, Polychaetes, Annelids, Neanthes arenaceodentata, Toxicant.

Exposure to sublethal concentrations of No. 2 Fuel Oil water-soluble fractions (WSFs) did not affect the ability of Neanthes arenaceodentata to increase its body hemoglobin content in response to hypoxia. Similar treatment using water-soluble fractions of South Louisiana crude oil likewise indicated little disruption of compensatory ability. Reduced dissolved oxygen (D.O.) concentrations did not significantly alter to toxicity of No. 2 Fuel Oil WSFs to N. arenaceodentata. Low D.O. concentrations markedly increased the toxicity of So. La. crude oil WSFs, producing a synergistic effect. Results were defined relative to the concentration of naphthalenes and total dissolved hydrocarbons in experimental media. Possible effects of petroleum hydrocarbons on the respiratory physiology of marine infauna were briefly considered. (Klein)
W78-00407

WATER QUALITY CRITERIA RESEARCH OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY, PROCEEDINGS OF AN EPA SPONSORED SYMPOSIUM ON MARINE, ESTUARINE AND FRESHWATER QUALITY, PRESENTED AT THE 26TH ANNUAL MEETING OF THE AIBS, AUGUST 1975.
Corvallis Environmental Research Lab., OR.
For primary bibliographic entry see Field 5B.
W78-00408

STRUCTURAL ANALYSIS OF STRESSED MARINE COMMUNITIES,
Corvallis Environmental Research Lab., OR.
R. C. Swartz, J. D. Walker, W. A. DeBen, and F. A. Cole.
In: Water Quality Criteria Research of the U.S. Protection Agency, Report EPA-600/3-76-079, p 3-12, 1976. 3 tab, 11 ref.

Descriptors: *Sewage, *Speciation, *Distribution patterns, *Density, *Ecosystems, *Biological communities, *Sewage effluents, *Benthos, *Systems analysis, Population, Sampling, Wastes, Environmental effects, Water quality, Water pol-

lution sources, Water pollution effects, Laboratory tests, Model studies, Food chains, Resistance.
Identifiers: *Diversity, *Species composition.

The impact of sewage sludge on macrobenthic assemblages in the New York Bight and in experimental microcosms was described as an illustration of the effects of stress on species composition, density, diversity, and heterogeneity. Structure analysis provided a good method for assessing ecological alterations at specific sites, but quantitative criteria such as diversity indices was not recommended as universal regulatory standards. Field surveys were recommended to be closely coordinated with laboratory investigations of the toxicity and accumulation of pollutants from those species which dominated community structure and function prior to human perturbation. (See also W78-00408) (Klein)
W78-00409

IMPACT OF CHLORINATION PROCESSES ON MARINE ECOSYSTEMS,
Environmental Research Lab., Gulf Breeze, FL.; and Environmental Research Lab., Johns Island, SC. Bears Bluff Field Station.
D. P. Middaugh, and W. P. Davis.
In: Water Quality Criteria Research of the U.S. Environmental Protection Agency, Proceedings, Report EPA-600/3-76-079, p 46-62, 1976. 1 fig, 5 tab, 47 ref.

Descriptors: *Chlorine, *Chlorination, *Aquatic life, *Water purification, *Ecosystems, *Toxicity, Sewage treatment, Disinfection, Water quality control, Chemistry, Environmental effects, Phytoplankton, Productivity, Invertebrates, Estuaries, Analytical techniques, Water quality.
Identifiers: Bioaccumulation.

The use of chlorine as a disinfectant and antifouling agent was reviewed. Chemical reactions of chlorine in aquatic environments were discussed, with particular emphasis on the formation of halogenated organic constituents in freshwater and marine systems. Studies of the effect of chlorinated sewage effluents and cooling water from generating stations on marine organisms and ecosystems were summarized. (See also W78-00408) (Klein)
W78-00413

TECHNIQUES TO ASSESS THE EFFECTS OF TOXIC ORGANICS ON MARINE ORGANISMS,
Environmental Research Lab., Gulf Breeze, FL.
D. J. Hansen.
In: Water Quality Criteria Research of the U.S. Environmental Protection Agency, Proceedings, Report EPA-600/3-76-079, p 63-76, 1976. 4 fig, 5 tab, 16 ref.

Descriptors: Research and development, *Design, *Bioassay, *Organic compounds, *Toxicity, *Toxins, *Estuaries, Aquatic life, Fish, Polychlorinated biphenyls, Pesticides, Aroclors, Ecosystems, Biological communities.
Identifiers: Cyprinodon variegatus, Toxaphene, Aroclor 1254.

Improvements in bioassay procedures were demonstrated using the effects of toxicants on the life-cycle of an oviparous estuarine fish, Cyprinodon variegatus. Effects of a polychlorinated biphenyl, Aroclor 1254, and the pesticide toxaphene on developing estuarine communities were investigated. (See also W78-00408) (Klein)
W78-00414

THE EFFECT OF SUBTLE TEMPERATURE CHANGES ON INDIVIDUAL SPECIES AND COMMUNITY DIVERSITY,
Environmental Research Lab., Narragansett, RI.
W. C. Johnson, II, and E. D. Schneider.
In: Water Quality Criteria Research of the U.S. Environmental Protection Agency, Proceedings, Report EPA-600/3-76-079, p 77-94, 1976. 11 fig, 2 tab, 30 ref.

Descriptors: *Biological communities, *Speciation, *Water temperature, *Thermal stress, *Thermal pollution, *Temperature, Sampling, Distribution, Resistance, Toxicity, Population, Environmental effects, Effluents, Crustaceans, Invertebrates.
Identifiers: *Diversity.

Responses due to thermal perturbation at the species level included marked changes in population abundances in temperature shifts of 1C although yearly temperature ranged 5C in natural surroundings: various species varied in population response due to temperature change; early life history stages were particularly sensitive. Entire communities underwent significant change when prolonged low level warming occurred due to heat effluents. Interaction between species, as in the case of the green crab and soft clam, changed with thermal fluctuations. Species diversity changed with ambient temperature for certain community types. (See also W78-00408) (Klein)
W78-00415

MODELS FOR TRANSPORT AND TRANSFORMATION OF MALATHION IN AQUATIC SYSTEMS,
Environmental Research Lab., Athens, GA.
For primary bibliographic entry see Field 5B.
W78-00416

A MATHEMATICAL MODEL OF POLLUTANT CAUSE AND EFFECT IN SAGINAW BAY, LAKE HURON,
Environmental Research Lab.-Duluth, Gross Ile, MI. Large Lakes Research Station.
For primary bibliographic entry see Field 5B.
W78-00418

MATHEMATICAL MODEL OF PHYTOPLANKTON GROWTH AND CLASS SUCCESSION IN SAGINAW BAY, LAKE HURON,
Environmental Research Lab.-Duluth, Gross Ile, MI. Large Lakes Research Station.
V. J. Bierman, Jr., and W. L. Richardson.
In: Water Quality Criteria Research of the U.S. Environmental Protection Agency, Proceedings, Report EPA-600/3-76-079, p 159-173, 1976. 10 fig, 18 ref.

Descriptors: *Mathematical studies, *Model studies, *Biomass, *Productivity, *Phytoplankton, Speciation, Zooplankton, Chlorophyll, Nutrients, Growth rates, *Lake Huron, Physiochemical properties, Phosphorus, Nitrogen, Silicon, Data collections.
Identifiers: *Model output, *Saginaw Bay(Lake Huron).

A mathematical model of phytoplankton production was applied to a set of physical, chemical and biological data from Saginaw Bay, Lake Huron. The model included four phytoplankton types, two zooplankton types, and three nutrients (P,N,Si). Model output correlated well with existing data for phytoplankton chlorophyll, total nitrogen, and dissolved forms of P, N, and Si. Model output did not agree with total P and total zooplankton data. (See also W78-00408) (Klein)
W78-00419

LAKE EUTOPHICATION: RESULTS FROM THE NATIONAL EUTROPHICATION SURVEY,
Corvallis Environmental Research Lab., OR.
J. H. Gakstatter, M. O. Allum, and J. M. Omernik.
In: Water Quality Criteria Research of the U.S. Environmental Protection Agency, Proceedings, Report EPA-600/3-76-079, p 185-205, 1976. 11 fig, 3 tab, 7 ref.

Descriptors: *Lakes, *Water quality, *Productivity, *Eutrophication, *Primary productivity, *Phosphorus, *Nitrogen, Water quality, Drainage systems, Watersheds(Basins), Land use, Water pollution sources, Inorganic compounds, Trophic level.

In the eastern U.S., a large percentage of the surveyed water bodies were impacted by municipal sewage treatment plant effluent and were in various states of enrichment. Primary production in 67% of the water bodies surveyed east of the Rocky Mountains was phosphorus-limited and 30% were nitrogen-limited according to algal assay results. Land use in the watershed was shown to be a significant factor in determining levels of phosphorus and nitrogen in streams in selected areas studied in the eastern United States. Average total phosphorus concentrations were about 10 times greater in streams draining agricultural areas than in streams draining forested areas; total nitrogen concentrations were about 5 times greater. The percentage of total nitrogen in the inorganic form was substantially higher in streams draining agricultural lands than in those streams draining forested lands. Phosphorus loading data for 23 selected survey lakes were applied to three general models relating annual total phosphorus loading rates to lake trophic conditions. The 'fit' of observed conditions to predictions made by each model was compared and discussed. (See also W78-00408) (Klein)
W78-00421

TUMORS AND AMYLOIDOSIS IN MICE PAINTED WITH CRUDE OIL FOUND ON BATHING BEACHES,
Tel-Aviv Univ. (Israel). Dept. of Histology and Cell Biology; Tel-Aviv Univ. (Israel). Dept. of Pathology; and Sheba Medical Center, Tel-Hashomer (Israel).
L. Barr-Nea, and M. Wolman.
Bulletin of Environmental Contamination and Toxicology, Vol. 18, No. 3, p 389-391, 1977. 3 fig, 1 tab, 4 ref.

Descriptors: Animals, Animal physiology, *Oil wastes, *Oil pollution, *Animal diseases, *Toxicity, Beaches, Water pollution sources, Laboratory tests, Pathology, Morbidity, Recreation, Seashores, Organic compounds, Cytological studies, Public health.
Identifiers: *Mice(Tumors), *Amyloidosis, *Crude oil, Israel, Tissue analysis, Histology, Carcinigones.

Oil lumps collected on the beaches of Israel in 1970, 1971, and 1973 were extracted with pure acetone and the extracts were used to paint the skin of mice twice weekly for 12 months. The oil lumps originated from crude oil spilled from tankers. The less recently collected oils induced papillomata and lymphomata in some animals. They were also more active than the recent oil in the induction of generalized amyloidosis. Mice painted for 12 months with acetone alone developed amyloidosis to a similar extent as those painted with the oldest oil. In previously reported experiments, however, acetone was much less active than the oil in producing amyloidosis after 5 months of painting. The possibility that acetone and oil might act both synergistically or to be antagonistic at different phases of amyloidogenesis is discussed. (Klein)
W78-00423

ORGANOCHLORINE PESTICIDE RESIDUES ASSOCIATED WITH MORTALITY: ADDITIVITY OF CHLORODANE AND ENDRIN,
Fish and Wildlife Service, Laurel, MD. Patuxent Wildlife Research Center.
J. L. Ludke.
Bulletin of Environmental Contamination and Toxicology, Vol. 16, No. 3, p. 253-260, 1976. 2 tab, 14 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, *Mortality, *Organic compounds, *Toxicity, *Birds, *Endrin, Biochemistry, Path of pollutants, Analytical techniques, Animal physiology, Laboratory tests.
Identifiers: *Chlordane, *Bobwhite quail, Additive effects, Bioaccumulation, Tissue analysis, Colinus virginianus.

No mortality occurred among birds (bob white quail) fed the control diet or those fed 10 ppm chlordane alone. Mortality among birds treated with 10 ppm endrin occurred on days 1 (N=1), 6 (N=7), 9 (N=5), and 10 (N=2). Mortality among birds of the chlordane-endrin treatment occurred on days 3 and 6-10 (N=14) of endrin exposure. Survivors were sacrificed on days 9 and 10 of endrin exposure. All birds treated with endrin alone or with chlordane followed by endrin lost weight. Controls and chlordane-treated birds did not lose weight, and lipid content of the carcasses was high. Chlordane-treated birds had lower carcass lipid content than did controls, but carcass mean weights were similar. Moribund individuals had lost considerable body weight and contained much less body fat than did individuals that were not exhibiting signs of intoxication when sacrificed. Birds that died from intoxication averaged weight losses of 32.2% (endrin-treated) and 31.4% (chlordane + endrin-treated) when comared with the control group. (Katz)
W78-00424

ACUTE TOXICITY OF PESTICIDE MIXTURES TO BLUEGILLS,
Fish and Wildlife Service, Columbia, MO. Fish-Pesticide Research Lab.
K. J. Macek.
Bulletin of Environmental Contamination and Toxicology, Vol. 14, No. 6, p. 648-652, 1975; 2 tab, 12 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, *Toxicity, *Mortality, *Organic pesticides, *Organic compounds, *Organophosphorous pesticides, Copper sulfate, Endrin, DDT, Dieldrin, Path of pollutants, Teleosts, Analytical techniques, Mode of action, Sunfishes, Bioassay.
Identifiers: Additive toxicity, *Bluegill, Tissue analysis, Bioaccumulation, Malathion, BHC, Baytex, Sevin, Chlordane, Diazinon, Dichloros, Endosulfan, EPN, Methoxychlor, Methyl parathion, Parathion, Perthane, Toxaphene, Zectran.

Eleven combinations of pesticides (mostly chlorinated hydrocarbons and organophosphorous compounds) tested had greater than additive toxicity to bluegills (Lepomis macrochirus). Sixteen combinations had no more than additive toxicity, and one - malathion and copper sulfate - had less than additive toxicity. DDT did not have greater than additive toxicity with any of the pesticides tested except BHC. Many organophosphorous insecticides being proposed as alternatives to more persistent pesticides were particularly active when combined with other chemicals. (Katz)
W78-00425

CONTINUOUS FLOW CULTURE OF BENTHIC DIATOMS AND ITS APPLICATION TO BIOASSAY,
Michigan Univ., Ann Arbor. Great Lakes Research Div.
For primary bibliographic entry see Field 5A.
W78-00427

WARNING TEST TO DETECT THE PRESENCE OF HIGHLY TOXIC CONCENTRATIONS OF POISONS IN WATER,
Landestelle fuer Gewaesserkunde und Wasserwirtschaftliche Planung, Baden-Wuerttemberg (West Germany).
For primary bibliographic entry see Field 5A.
W78-00428

THE DYNAMICS OF BIOLOGICALLY AVAILABLE MERCURY IN A SMALL ESTUARY,
Hawaii Univ., Honolulu. Dept. of Zoology and Water Resources Research Center.
For primary bibliographic entry see Field 5B.
W78-00430

EFFECT OF IODOPHORE ON THE SPERM AND EGGS OF RAINBOW TROUT, (EFFETS DES IDOPHORES SUR LES GAMETES ET LES OEUFS DE TRUITE ARC-EN-CIEL),
Institut National de la Recherche Agronomique, Jouy-en-Josas (France). Lab. de Physiologie des Poissons.
R. Billard, and G. de Montalembert.
Bulletin Francais de Pisciculture, No. 263, p 41-44, 1976. 2 fig, 1 tab, 4 ref.

Descriptors: *Iodine, *Salmonids, *Trout, *Toxicity, *Rainbow trout, Fertilization, Mortality, Fish eggs, Fish reproduction, Mode of action, Path of pollutants, Resistance, Water quality, Aquiculture, Fish farming, Fish hatcheries.
Identifiers: *Iodophors, Gametes, Spermatozoa.

Toxicity of iodophors added to the diluent for insemination or to fresh water (50 ppm of iodine) was examined on rainbow trout ova and eggs at various stages of insemination. Freshly collected ova were sensitive to iodophors; the loss of fertility was about 10 per cent. No fertilization occurred when iodophors were used at the time of insemination suggesting an unfavorable effect of iodophors on spermatozoa. However, no significant loss of eggs was observed when iodophors treatment was administered after 30 mn water hardening. (Klein)
W78-00431

OZONE DISINFECTION OF FLOWING WATER,
Oregon Dept. of Fish and Wildlife, Clackamas.
For primary bibliographic entry see Field 5F.
W78-00432

NITRITE-INDUCED METHEMOGLOBINEMIA IN RAINBOW TROUT,
Fish and Wildlife Service, Bozeman, Montana, Fish Culturist Development Center.
C. E. Smith, and R. C. Russo.
The Progressive Fish-Culturist, Vol. 37, No. 3, p. 150-152, 1975; 1 tab, 10 ref.

Descriptors: *Nitrites, *Rainbow trout, *Salmonids, *Trout, *Fish physiology, *Organic compounds, Nitrogen compounds, Mode of action, Laboratory tests, Freshwater fish, Water quality, Aquiculture.
Identifiers: *Methemoglobinemia, *Hemoglobin, Fish blood, Tissue analysis.

The minimum nitrite concentration required to induce methemoglobinemia (M-Hb) in rainbow trout (Salmo gairdneri) was investigated. When compared with controls, exposure to 0.096 mg/l NO2 for 8 days resulted in a significant elevation (P 0.01) of M-Hb. Exposure to higher NO2 concentrations for shorter time periods also resulted in increases in M-Hb. There was no significant difference in total Hb concentrations of test fish when compared with controls. (Katz)
W78-00434

FACTORS AFFECTING NUTRIENT LOADS IN SOME IOWA STREAMS,
Iowa State Univ., Ames. Dept. of Animal Ecology.
For primary bibliographic entry see Field 5B.
W78-00449

AQUATIC INSECT DIVERSITY AND BIOMASS IN A STREAM MARGINALLY POLLUTED BY ACID STRIP MINE DRAINAGE,
Pennsylvania State Univ., University Park. Dept. of Biology.
S. M. Tomkiewicz, and W. A. Dunson.
Water Research, Vol. 11, No. 4, p. 397-402, 1977. 3 fig, 2 tab, 15 ref. OWRT A-042-PA(1).

Descriptors: *Acid streams, *Aquatic insects, *Acid mine water, *Water pollution effects, *Streams, Biomass, Varieties, Animal groupings, *Pennsylvania, Mine water, Acid mine water.
Identifiers: *Upper Three Runs(Pa).

The effect of a moderate degree of acid mine drainage on biomass and diversity of an aquatic insect population was investigated in Upper Three Runs Pennsylvania, where the pH was reduced from 6 to about 4.5. The acid feeder itself (pH near 3.2) was inhabited only by a chironomid, a megalopteran (Sialis) and the caddisfly Ptilostomis. The acidic water input into the stream caused a drop in the Shannon-Weiner diversity index from 3.10 to 1.95, and a drop in biomass from 6.5 g/sq m to 2.2 g/sq m. Further downstream the diversity index remained relatively constant and the biomass leveled off at about 1.2 g/sq m. The number of taxa declined steadily from 30 at the unpolluted station to 13 at the lowest site, 1.9 km downstream from the pollution source. Populations of Coleoptera, Ephemeroptera and Trichoptera showed little or no recovery as the acid pollution ameliorated slightly. Diptera and Plecoptera species (especially Nemoura) showed a decided recovery and numerical increases near pH 5.0. There were no fish populations in the stretch of stream investigated but brook trout and sculpins were numerous at the control station. The polluted reach of the stream would be able to support a small fish population if it were possible to acclimate or introduce genetically-suitable species. (Auen-Wisconsin)
W78-00451

EFFECTS OF SOME HERBICIDES APPLIED IN THE FOREST TO THE FRESHWATER FISHES AND OTHER AQUATIC ORGANISMS--III. EXPERIMENTS ON THE ASSESSMENT OF ACUTE TOXICITY OF HERBICIDES TO AQUATIC ORGANISMS,
Tokai Regional Fisheries Research Lab., Yokosuka (Japan).
Y. Matida, S. Kimura, H. Tanaka, and M. Yokote.
Bulletin of Freshwater Fisheries Research Laboratory, Vol. 26, No. 2, p 79-83, 1976. 3 tab, 4 ref.

Descriptors: *Herbicides, *Toxicity, *Aquatic life, *Organic compounds, *Sodium compounds, *Toxins, *Sulfur compounds, 2,4-D, 2,4,5-T, Caddisflies, Salmonids, Salmon, Aquatic insects, Insect resistance, Path of pollutants, Water pollution sources, Ammonium compounds, Laboratory tests.
Identifiers: Bioaccumulation, Sodium chlorate, Ammonium sulfamate, Sodium 2,2,3,3,-tetrafluoropropioate, Sowbugs, Cherry salmon.

Acute toxicity of sodium chlorae, 2,4-d and 2,4,5-T, ammonium sulfamate, and sodium 2,2,3,3,tetrafluoroproionate to sow bugs (Asellus hilgendorffii), caddisfly (Stenopsyche griseipennis), dace carp fry, and cherry salmon fingerlings were studied. Effects of grain formulation of sodium chlorate were larger than those of reagent grade sodium chlorate to the aquatic organisms. Toxic effects of sodium chlorate to the organisms were weak. A mixture of 2,4-D and 2,4,5-T showed strongly toxic effects even at a fairly low concentration such as 0.47-0.62 ppm. Toxic effects of ammonium sulfamate were weak to the aquatic organisms. Sodium 2,2,3,3,-tetrafluoropropionate showed no effect to the aquatic organisms. (See also W78-00455) (Klein)
W78-00454

EFFECTS OF SOME HERBICIDES APPLIED IN THE FOREST TO THE FRESHWATER FISHES AND OTHER AQUATIC ORGANISMS--IV. EXPERIMENTS ON THE ASSESSMENT OF

ACUTE AND SUBACUTE TOXICITIES OF 2,4,5-T TO THE RAINBOW TROUT,
Tokai Regional Fisheries Research Lab., Yokosuka (Japan).
M. Yokote, S. Kimura, H. Kumada, and Y. Matida.
Bulletin of Freshwater Fisheries Research Laboratory, Vol. 26, No. 2, p 85-93, 1977. 3 fig, 6 tab, 6 ref.

Descriptors: *Herbicides, *2,4,5-T, *Rainbow trout, *Trout, *Salmonids, *Toxicity, *Fish physiology, Mortality, Organic compounds, Path of pollutants, Chlorinated hydrocarbon pesticides, Pathology, Laboratory tests, Bioassays.
Identifiers: Bioaccumulation, Tissue analysis, Histology, Pegnol-1000, Toxicant.

Effects of reagent grade 2,4,5-T emulsified with Pegnol-1000 to the rainbow trout were greater than those of ragent grade 2,4,5-T acetone solution. Weedon at a concentration of 0.02 ppm obviously retarded the growth of the rainbow trout. A several number of fish died during the period of the experiment (12 weeks). The exposed fish showed pathological changes in the liver, kidney, heart, and skin. Reagent grade 2,4,5-T at a concentration of 0.05 ppm had no effect on the fish during the period of the experiment. But, histological changes of a slight degree were observed in the liver, kidney, heart, and skin. Pegnol-1000 at a concentration of 0.425 ppm showed no effect to the rainbow trout. (See also W78-00454) (Klein)
W78-00455

FURTHER TOXICOLOGIC STUDIES WITH COMMERCIAL AND CANDIDATE FLAME RETARDANT CHEMICALS. PART II,
Cornell Univ., Ithaca, NY. Dept. of Neurobiology and Behavior.
A. T. Eldefrawi, L. B. Brattsten, and D. J. Lisk.
Bulletin of Environmental Contamination and Toxicology, Vol. 17, No. 6, p. 720-726, 1977. 4 tab, 12 ref.

Descriptors: *Organic compounds, *Toxicity, *Enzymes, *Proteins, *Fish physiology, Freshwater fish, Biochemistry, Inhibition, Metabolism, Inhibitors, Organic compounds, Path of pollutants, Mode of action, Mortality, Cytological studies, Bioassay.
Identifiers: *Goldfish, *Flame retardants, Bioaccumulation, Tissue analysis, Cholinesterase inhibition.

A number of commercial and candidate flame retardants were studied with regard to their toxicity to goldfish, inhibition of cholinesterase, inhibition of acetyl choline binding to its receptor and insecticidal properties. Several of the flame retardants were notably toxic to fish. Some of the compounds showed modest inhibition of cholinesterase and/or microsomal oxidases, but none inhibited acetyl choline receptor binding. Whereas several of the flame retardants showed little or no insecticidal properties when added alone to a housefly diet, piperonyl butoxide greatly synergised their toxicity to houseflies. (Katz)
W78-00456

THE ECOLOGICAL EFFECTS OF COAL STRIP-MINING: A BIBLIOGRAPHY WITH ABSTRACTS,
Colorado State Univ., Fort Collins. Natural Resource Ecology Lab.
S. Ralston, D. Hilbert, D. Swift, B. Carlson, and L. Mengies.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-265 316, Price codes: A18 in paper copy, A01 in microfiche. Publication No. FWS/OBS-77/09, March 1977, 416 p. WELUT No. 13.1-76, FWS 14-16-0008-2107.

Descriptors: *Strip mine wastes, *Revegetation, *Pollution, Ecology, Coal, Rehabilitation, Land use, Great Plains, Environmental effects, *Bibliographies, *Abstracts.

The bibliography contains references with abstracts, on the ecological effects of coal strip-mining in western United States, with particular emphasis on the Northern Great Plains. It does not represent an exhaustive search of all possible literature, but its broad scope will make it useful to workers engaged in strip-mine rehabilitation. There are two parts to this bibliography; part I contains the references and abstracts, part II is an extensive 'key work in Title' index to the references. (Fish and Wildlife Service)
W78-00495

5D. Waste Treatment Processes

PHYSICAL AND CHEMICAL METHODS,
Research-Cottrell, Bound Brook, N.J.
Chemical Engineering, Vol. 84, No. 17, p 135-138, August, 1977. 1 fig, 14 ref.

Descriptors: *Adsorption, *Chemical reactions, *Membrane processes, *Ion exchange, *Industrial wastes, Activated carbon, Ozone, Oxidation, Organic wastes, Chemical wastes, Filtration, Reverse osmosis, *Waste water treatment, Recycling.
Identifiers: Chemical treatment.

Various physical and chemical methods of industrial waste water treatment are discussed. Industrial applications where adsorption with activated carbon is used to remove organic pollutants are described, including those used at Hercules Naval Stores, Calgon Corporation, American Cyanamid Company, and Du Pont. The activated carbon process patented by Du Pont involves the direct addition of powdered activated carbon to the waste water feed to the aeration tanks of the activated sludge system. Typical carbon dosages of 50-220 ppm reduce the COD in the effluent by 50%. A multiple hearth furnace is used for both carbon regeneration and sludge incineration. A moving-bed carbon adsorption system is being used by American Cyanamid to reduce refractory organics in effluent. Chemical treatment processes for organic wastes which are described include ozonation for the destruction of organic material, oxidation in the form of aeration, and high-temperature incineration. Applications of membrane processes are described, including reverse osmosis, ultrafiltration, and electrodialysis. Ion exchange is evaluated for closed-loop recycle systems. (Schulz-FIRL)
W78-00006

PROCESS FOR TREATING AN ACIDIC WASTE WATER STREAM,
Societe Anonyme Texaco Belgium N.V., Brussels. (Assignee).
A. Benoit, S. A. R. Dewaele, and A. Verhelst.
United States Patent 4,035,293. Issued July 12, 1977. Official Gazette of the United States Patent Office, Vol. 960, No. 2, p 779, July, 1977. 1 fig.

Descriptors: *Acidic water, *Chemical wastes, *Phosphorus compounds, *Organophosphorus compounds, *Separation techniques, Chemical precipitation, Chemical reactions, *Patents, Hydrogen ion concentration, Industrial wastes, *Waste water treatment.
Identifiers: Phosphonic acids, Phosphoric acids, Mono(beta-hydroxyethyl) alkene thiophosphonate.

A continuous waste water treatment process for acid residues from methanol distillation for the manufacture of mono (beta-hydroxyethyl) alkene thiophosphonate is described. The effluent to be treated should be an aqueous effluent which contains phosphonic acids of general formula CnH2n + 1PO3H2 where n = 12 to 24, and phosphoric acid in a ratio of up to 75:25. The effluent and a slurry of 55-93 weight percent of a reagent of the calcium oxide and calcium hydroxide groups are mixed in a reaction zone. The amount of reagent added to the effluent is proportional to the amount of acid present in the effluent. The mixture is maintained at a temperature of 80-100 C for 1-30 minutes, raising the pH from its initial level of 1.2-3.0 to 8-12. A precipitate, which can be continuously removed from the reactor, and a clear aqueous phase are formed. (Schulz-FIRL)
W78-00007

CARBON ADVANCED WASTE TREATMENT PLANT HANDLES 20 MGD,
Industrial Wastes, Vol 23, No. 4, p 40-41, July/August, 1977.

Descriptors: *Tertiary treatment, *Activated carbon, *Incineration, *Organic wastes, *Chemical wastes, Industrial wastes, Adsorption, Heat treatment, Organic compounds, Sludge disposal, Effluents, *Waste water treatment, New Jersey.

A 22.4 million advanced waste water treatment facility being constructed for the American Cyanimid Company in Bound Brook, New Jersey, is described. The facility will provide tertiary treatment for 20 mgd of effluent from the existing secondary treatment plant, which was constructed in 1958 to treat waste waters resulting from the manufacture of organic chemicals. The plant will contain two multiple hearth furnaces designed by Nichols Engineering and Research Corporation to dispose of the secondary waste-activated sludge and to regenerate carbon used in activated carbon adsorption. Secondary effluent is piped to a system of 10 activated carbon columns, 16 ft in diameter and 48 ft high. Organics are absorbed and effluent is discharged into the river. Sludge from the secondary treatment plant is dewatered and incinerated into ash in a multiple hearth furnace. A Nichols 9 hearth furnace, approximately 26 ft in diameter, is used to thermally regenerate carbon. Spent carbon is dried at 210 F in the first zone of the furnace, treated by pyrolysis at 750 F in the second zone, and regenerated at 1700-1800 F in the presence of steam. After water quenching, the regenerated carbon is hydraulically transported to a carbon column or storage area. A venturi scrubber cleans the exhaust gases before they are discharged to the atmosphere through the furnace exhaust stack. (Schulz-FIRL)
W78-00008

ON-SITE CARBON REGENERATION SYSTEM SOLVES EFFLUENT PROBLEM.
Industrial Wastes, Vol. 23, No. 4, p 29, July/August, 1977. 1 tab.

Descriptors: *Chemical wastes, *Pre-treatment(Water), *Activated carbon, *Organic wastes, Equipment, Adsorption, Industrial wastes, Color, Chemical oxygen demand, Biochemical oxygen demand, Phenols, Effluents, *Waste water treatment, *Canada.
Identifiers: Activated carbon regeneration, Elmira(Ontario Canada), Kilns.

An activated carbon regeneration system is being used to treat aqueous effluents at the Elmira Uniroyal organic chemicals plant in Ontario. Manufactured by C-E Bauer (Canada) , a division of Combustion Engineering Inc in Brantford, Ontario, the unit reactivates 2500 lb/day of spent granular activated carbon which is used to precondition the plant's waste water to reduce color, COD, BOD, and TOC. The carbon regeneration system includes a direct-fired rotary kiln which is 3 ft in diameter and 20 ft long. Spent carbon flows from the bottom of an adsorber to an inclined screw which dewaters the slurry as it travels into the kiln. Moving in a direction countercurrent to the hot gases in the kiln, the carbon is dried, heated, and finally held in a hot zone at 1700 F under a controlled atmosphere for regeneration. After discharge into a water quench tank, the carbon is re-introduced into the adsorption system as a slurry. The C-E Bauer system also includes an afterburner and a wet scrubber for cleaning gases

before discharge into the atmosphere. A comparison of effluent quality at the Elmira Water Pollution Control Plant before and after the institution of carbon treatment at the Uniroyal Plant is presented. (Schulz-FIRL)
W78-00009

RO WATER TREATMENT SYSTEM.
Mechanical Engineering, Vol. 99, No. 8, p 58, August 1977.

Descriptors: *Reverse osmosis, *Membrane processes, *Chemical wastes, *Paints, *Treatment facilities, Industrial wastes, Equipment, Costs, Water reuse, *Waste water treatment.
Identifiers: Japan.

A reverse osmosis waste water treatment system which was designed by Shinko-Pfaudler Ltd has been installed at the Mooka plant of Kobe Steel Ltd in Japan. The system is used to treat rinse water from an electropainting line where an acrylic base finish is applied to aluminum window frames. The system includes 30 B-9 'Permasep' permeators which separate the acrylic paint and accompanying solvents from the rinse water. Additional means of waste disposal are unnecessary, as the system is a closed one and the acrylic finishes and water are reused. Annual costs for finishing 6000 tons of aluminum window frames dropped from $300,000 to $180,000 with the installation of the reverse osmosis system. A net saving of $90,000 is realized after the cost of electricity to operate the system ($6700) and costs to cover permeator and cartridge filter replacement ($23,000) are subtracted. These figures suggest that the unit will pay for itself in cost savings for raw materials, water, and waste disposal in less than 2 years. (Schultz-FIRL)
W78-00010

TREATING WATER FIVE WAYS.
Journal of the institution of Engineers (India), Vol. 26, No. 9, p 28-29, March, 1977.

Descriptors: *Organic wastes, *Pipelines, *Chemical wastes, *Storm water, *Chemical industry, Treatment facilities, Effluents, Sewage treatment, Industrial wastes, *Waste water treatment.
Identifiers: Brunsbuttel(West Germany).

A DM6.5 million waste water treatment facility is being used to treat 1000 cu m of waste water per day from the Bayer chemical complex near Brunsbuttel on the Elbe River in West Germany. The waste water treatment complex has provisions for conventional sewage, water containing organic chemicals, water containing organic salts, cooling water, and storm water. Ditches collect sewage destined for processing at the treatment plant. On-line pre-treatment is used for water contaminated by organic chemicals. Heated cooling water and water contaminated with organic salts are pumped into separate pipelines, monitored, and discharged to the Elbe River via surface pipelines. Storm water is conducted via storm drains to drainage canals at the perimeter of the industrial complex. Construction of the facility involved the emplacement of a 400 m pipeline into the Elbe. (Schulz-FIRL)
W78-00011

CHEMICALS AND ALLIED PRODUCTS, (LITERATURE REVIEW),
Union Carbide Corp. South Charleston, W. Va.
R. F. Nelson, and J. C. Hovious.
Journal Water Pollution Control Federation, Vol. 49, No. 6, p 1201-1206, June, 1977. 52 ref.

Descriptors: *Chemical wastes, *Oil wastes, *Biological treatment, *Industrial wastes, *Recycling, Textiles, Acids, Phenols, Pesticides, Activated sludge, Activated carbon, Treatment facilities, Pilot plants, *Waste water treatment, Waste disposal, *Bibliographies.

Literature pertaining to the treatment of wastes produced during the manufacture of chemicals and allied products is reviewed. Characteristics of waste water are discussed according to product type, inlcuding TNT, coal gasification, urea, synthetic resins, plastics, polyvinyl chloride, ethyl benzene, dimethyl terephthalate, formaldehyde, and various organic wastes. Biological treatment methods through modifications of the activated sludge process are described. Studies on physical-chemical treatment are described for petrochemical wastes and wastes resulting from the manufacture of synthetic rubber. Various studies on source treatment and resource recovery techniques are presented, with topics including zinc recovery from rayon sludges, cyanide destruction, sodium sulfide removal, phenol removal, pesticide destruction, and dye removal. (Schulz-FIRL)
W78-00012

FATE OF CYANIDE AND RELATED COMPOUNDS IN AEROBIC MICROBIAL SYSTEMS--I. CHEMICAL REACTION WITH SUBSTRATE AND PHYSICAL REMOVAL,
Rice Univ., Houston, Tex. Dept. of Environmental Science and Engineering.
S. F. Raef, W. G. Characklis, M. A. Kessick, and C. H. Ward.
Water Research, Vol. 11, No. 6, p 477-483, 1977. 10 fig, 3 tab, 15 ref.

Descriptors: *Cyanide, *Chemical wastes, *Adsorption, *Metabolism, *Chemical reactions, Kinetics, Microorganisms, Biological treatment, Industrial wastes, Carbohydrates, *Waste water treatment, Aerobic bacteria, Aerobic treatment.
Identifiers: Glucose.

Reaction mechanisms of the removal of cyanide during waste water treatment were investigated in laboratory studies using sealed glass ampules with glucose as a substrate and organic buffers. The rate of cyanide removal with respect to time was examined at 30C. Results indicated that the reaction of cyanide with glucose was first order with an optimum pH near 11.0. The biochemical metabolism of glucose/cyanide reaction products was investigated with three sets of growth experiments on the aldonic acid products of glucose-cyanide reaction. The aldonic products were biodegradable in shake flasks and manometric BOD bottles with acclimated and unacclimated seed cultures and a sequential metabolism was suggested by the presence of two plateaus. In adsorption studies with Bacillus magaterium and heterogeneous flocculant bacteria, cyanide was not reduced by contact with non-flocculating cells but was reduced by up to 12% after a one-hour contact period with flocculating cells. In stripping experiments with a microfermenter, 100% of the cyanide was recovered with no biological solids present. An initial decrease in stripping rates was observed when biological solids were present. This was attributed to physical adsorption, metabolism, or possible cyanide reaction with biological polymers. Detoxification with glucose is suggested as a possible method of treating cyanide-containing wastes when aldose carbonhydrates are available as wastes from other industries. (See also W78-00014) (Schulz-FIRL)
W78-00013

FATE OF CYANIDE AND RELATED COMPOUNDS IN AEROBIC MICROBIAL SYSTEMS--II. MICROBIAL DEGRADATION.
Rice Univ., Houston, Tex. Dept. of Environmental Science and Engineering.
S. F. Raef, W. G. Characklis, M. A. Kessick, and C. H. Ward.
Water Research, Vol. 11, No. 6, p 485-492, 1977. 10 fig, 3 tab, 18 ref.

Descriptors: *Biodegradation, *Organic compounds, *Activated sludge, *Aerobic treatment, Biological treatment, Chemical wastes, Industrial wastes, Chemical reactions, *Waste water treatment, Microbial degradation.
Identifiers: Cyanide, Cyanide removal.

Microbial degradation was investigated as a mechanism of cyanide removal during activated sludge treatment in addition to adsorption, stripping, and reaction with substrate. Heterogeneous cultures of sewage organisms were acclimated in a 6-liter aerated continuous-flow reactor. Glucose and cyanide were added to starved, acclimated cultures in a microfermenter. Gas washer solutions and reactor solids were analyzed for H(14)CN, (14)CO2, and for (14)C incorporated into cellular material. Analyses indicated that the acclimated heterogeneous cultures could readily metabolize glucose in the presence of cyanide and that as much as 50% of the cyanide was metabolized. The relative order of magnitude of cyanide removal by cyanide-acclimated heterogeneous cultures at neutral pH and aerated conditions was: stripping > metabolism > adsorption > chemical reaction with substrate. (See also W78-00013) (Schulz-FIRL)
W78-00014

PLANNING CHEMICAL MONITORING PROGRAMS FOR INDUSTRIAL FACILITIES AND ELECTRIC POWER PLANTS,
Westinghouse Electric Corp., Pittsburgh, PA. Environmental Systems Dept.
For primary bibliographic entry see Field 5A.
W78-00015

ANAEROBIC DIGESTION OF HIGH STRENGTH INDUSTRIAL WASTEWATERS,
Newcastle-upon-Tyne Univ. (England). Public Health Engineering Div.
G. K. Anderson, and T. Donnelly.
The Public Health Engineer, Vol. 5, No. 3, p 64-71, May, 1977. 5 tab, 28 ref.

Descriptors: *Anaerobic digestion, *Activated sludge, *Filtration, *Organic wastes, *Industrial wastes, Sludge treatment, Design criteria, Pilot plants, Farm wastes, Chemical wastes, *Waste water treatment.
Identifiers: Anaerobic activated sludge, Anaerobic filters.

An anaerobic activated sludge process was developed for the treatment of high-strength industrial organic waste waters. Minimum solids retention time in a digester contact tank and the addition and maintenance of a biological phase are required. Overall process environmental requirements which are discussed include: Anaerobic conditions; temperature; pH; alkalinity and volatile acid concentrations; toxic materials, such as salts, ammonia, and heavy metals, and their control; and nutritional requirements. Basic parameters which are used in anaerobic digester design are discussed, including loading rate, hydraulic retention time, and sludge retention time. The anaerobic activated sludge processing unit includes a continuously-fed, completely-mixed reactor equipped with some form of degassification and settling. Applications of the anaerobic activated sludge process are described. Laboratory studies on the treatment of a high-strength, soluble synthetic sewage at the University of Newcastle-upon-Tyne, England are described. A pilot scale anaerobic contact system was operated under various MLSS concentrations, underflow SS concentrations, and solids retention times. Performance data of the anaerobic contact digester are presented for a wide variety of industrial wastes including slaughterhouse, meat packing, maize starch, distillery, citrus, yeast, milk, acetic acid, dextrose, pig, and chemical wastes. The use of an anaerobic filter, an upflow digester equipped with an inert media for the retention of a biological mass, is described. (Schulz-FIRL)
W78-00016

EFFECTIVE MEASUREMENT OF CHLORINE RESIDUAL,
For primary bibliographic entry see Field 5A.
W78-00017

WASTE WATER PURIFICATION.
International Dyer and Textile Printer, Vol. 158, No. 2, p 89, July, 1977.

Descriptors: *Activated sludge, *Biochemical oxygen demand, *Organic wastes, *Food processing industry, Sludge treatment, Equipment, Industrial wastes, *Waste water treatment.

The Multox process for the reduction of BOD in organic industrial wastes is a multi-stage activated sludge process which was developed by Menzel Abwassertechnik of Stuttgart, Germany. Advantages of the system include: control of fluctuations in pH, concentration, and toxicity; high space loadings; flow equalization; treatment of organic acids without neutralization; short-circuit currents; dissolved oxygen monitoring and input; and lower production of excess sludge. The process is particularly applicable in the food processing industry. An example of BOD reductions by the use of the Multox process in a pickled cabbage factory is presented. (Schulz-FIRL)
W78-00019

RUBBER LININGS ALLEVIATE STICKY POLLUTION PROBLEM.
For primary bibliographic entry see Field 8G.
W78-00020

HANDLING OF WASTE STREAM SLUDGES,
J. Ford.
Process Biochemistry, Vol. 12, No. 5, 16-17, June, 1977. 2 tab, 7 ref.

Descriptors: *Dewatering, *Sludge treatment, *Centrifugation, *Separation techniques, *Food processing industry, Dairy industry, Sewage treatment, Chemical wastes, Industrial wastes, *Waste water treatment.
Identifiers: Brewery wastes, Distillery wastes, Pharmaceutical wastes, Sludge dewatering, Instant coffee mannufacturing.

Waste water treatment and disposal options used in the biochemical industry are described. Sludge characteristics for the wastes, which generally result from simple sedimentation or biological treatment, are described according to source industry. Principal types of mechanical dewatering equipment which are available for use in the treatment of organic wastes include filter press, centrifuge, rotary vacuum filter, and filter belt press. Specific application of centrifugation for industrial sludge dewatering are described. Treatment of the spent wash from grain whiskey distillery operations with a Decanter Centrifuge for protein recovery is described. The operation of a Decanter Centrifuge to remove excess suspended solids for the production of animal feed from effluent produced in the manufacture of instant coffee is also described. Applications of the Decanter Centrifuge to dairy, creamery, and municipal wastes are examined. (Schulz-FIRL)
W78-00021

WASTEWATER TREATMENT IN BREWING AND DISTILLING,
Imperial Chemical Industries Ltd., Hyde (England). Pollution Control Systems.
W. Campbell.
Process Biochemistry, Vol. 12, No. 5, p 6-8, 32, June, 1977. 8 ref.

Descriptors: *Fermentation, *Food processing industry, *Organic loading, *Acidity, *Nutrient requirements, Suspended solids, Industrial wastes, *Waste water treatment, Biological treatment.
Identifiers: *Brewery wastes, *Distillery wastes.

Principles of operation and treatment plant design are described for waste water resulting from brewing and distillation. Biological treatment methods have traditionally been used, since wastes from brewing and distilling are primarily in the form of carbohydrates derived from fermentation. Factors which affect aerobic biological treatment efficiency and design include impurity load, alkalinity or acidity, nutrient concentrations, and solids removal. Operating experiences illustrating the effects of these factors are presented. Poor quality effluents at a brewery waste water treatment plant with multistage high rate biofiltration were attributed to batch discharging and low weekend loading on the biological filters. Similar circumstances are described for two malt distilleries equipped with animal feed recovery plants. Examples of the effects of acidity on plant operation and the use of alkalis to regulate pH are presented. The effects of nitrogen and phosphorus deficiencies on multi-stage treatment units are examined. The need for removal of suspended solids both before and after the biological stage of treatment is discussed. (Schulz-FIRL)
W78-00022

HIGH PURITY PROTEIN RECOVERY,
Viscose Group Ltd., Swansea (Wales).
D. E. Palmer.
Process Biochemistry, Vol. 12, No. 5, p 24-26, 28, June, 1977. 5 fig, 4 tab.

Descriptors: *Proteins, *Amino acids, *Dairy industry, *Membrane processes, *Filtration, Biochemistry, Feeds, Ion exchange, Separation techniques, Food processing industry, Industrial wastes, *Waste water treatment.
Identifiers: Ultrafiltration, Whey recovery, *Protein recovery.

The Vistec protein recovery process was investigated for the isolation of protein from solution by means of ion exchange to recover high purity, undenatured, functional protein from cheese whey. The treatment system includes a holding tank and a filter bottom-stirred tank reactor. The separation process involves separation and isolation of protein using the Vistec ion exchange system, concentration of the proteinaceous eluate by ultrafiltration, and drying with a spray dryer to recover the protein powder. Use of the Vistec system as a primary system where the dilute protein liquors are concentrated by ultrafiltration and spray drying is described. Use of the system for the simple treatment method of spray drying of whole whey is illustrated. An example is presented showing how the Vistec system may be used in conjunction with an existing system, which includes ultrafiltration, to produce a final 30% protein product. Improvement of process efficiency by pre-concentration of the protein-containing effluent with ultrafiltration is discussed. Production costs and chemical and physical properties of the Vistec whey protein isolate are presented. (Schulz-FIRL)
W78-00023

EFFLUENT CONTROL IN FOOD PROCESSING INDUSTRIES,
B. F. Mortensen.
Process Biochemistry, Vol. 12, No. 5, p 19-22, June, 1977. 7 fig.

Descriptors: *Dairy industry, *Food processing industry, *Foreign countries, *Organic wastes, *Biochemical oxygen demand, Treatment facilities, Industrial wastes, *Waste water treatment, Waste disposal.
Identifiers: *Denmark, Slaughterhouse wastes, Brewery wastes, Dairy wastes.

Effluent control in food processing industries and in treatment plants operating in Denmark are described. Danish standards for effluent quality are based on the nature of the receiving waters, including lakes, rivers, fiords, and the open sea. Effluent characteristics of dairy wastes are described. Results of investigations at the Government Research Institute for Dairy Industry are presented. Various methods of biological treatment were evaluated for use in the dairy industry, including the oxidation ditch; high rate trickling filters with stones and corrugated plastic plates or plastic balls as filter media; and alternating double trickling filters. Studies indicated that the oxidation ditch was the most viable method for BOD reduction of dairy wastes, operating well even at 200% BOD overloading or 0.5 kg BOD/d/sq m aerated volume. The treatment facility at the Borup Dairy in Borup, Sealand, is described. Effluent characteristics of slaughterhouse wastes are also described. A testing program conducted by the Danish Meat Research Institute on biological and chemical treatment systems to reduce BOD in slaughterhouse wastes is presented. Operations of several Danish slaughterhouses, including Slaughterhouse Region South, Danish Crown Abattoir in Vojens, and Moghan Sheep and Cattle Slaughterhouse, are described. Waste water treatment and operations at rendering plants are examined. Brewery wastes from the brewing and bottling phases of operation are discussed. Operations of the FAXE Brewery in Fakse are described. (Schulz-FIRL)
W78-00024

FRUIT-, VEGETABLE-, AND GRAIN-PROCESSING WASTES, (LITERATURE REVIEW),
Environmental Associates, Inc., Corvallis, OR.
M. R. Soderquist, and J. L. Graham.
Journal Water Pollution Control Federation, Vol. 49, No. 6, p 1118-1123, June, 1977. 47 ref.

Descriptors: *Food processing industry, *Recycling, *Canneries, Industrial wastes, Organic wastes, Waste treatment, Membrane processes, Waste disposal, Effluents, Toxicity, Reviews, *Waste water treatment, *Bibliographies.
Identifiers: Fruit processing wastes, Vegetable processing wastes, Grain processing wastes.

Literature pertaining to the processing of fruit-, vegetable-, and grain-processing wastes is reviewed. Federal and state regulation, waste characteristics, technology, disposal methods, and general aspects of treatment are discussed. The use of mathematical models in predicting the performance of a biological treatment system is discussed. Treatment and disposal methods which are presented include spray irrigation, overland flow, membrane treatment, ultrafiltration, and waste recycling. Methods to reduce water consumption, pollution generation, and toxic effects of waste waters from food processing industries are discussed. Various methods of treatment and disposal with applications to particular industries are described, including tomato processing, grape crushing, apple processing, citrus fruit processing, olive oil extraction, and cherry processing. Aspects of treatment and disposal are discussed for various vegetable processing industries, including potato processing, bean processing, sauerkraut wastes, and corn processing. (Schulz-FIRL)
W78-00025

BIOLOGICAL FILTERS, (LITERATURE REVIEW),
S. L. Klemetson.
Journal Water Pollution Control Federation, Vol. 49, No. 6, p 1001-1005, June, 1977. 28 ref.

Descriptors: *Filtration, *Biological treatment, *Trickling filters, *Mathematical models, *Costs, Biodegradation, Microorganisms, Packed beds, Waste assimilative capacity, Filters, Organic wastes, Chemical reactions, Operation and maintenance, Effluents, Industrial wastes, Municipal wastes, *Waste water treatment.
Identifiers: Rotating biological contactors.

Literature pertaining to the use of biological filters in waste water treatment is reviewed. Mathematical models which have been developed to predict filter performance and to establish optimum process parameters are presented. Some specific objectives which the models were designed to meet include: prediction of the amount of substrate removal by slime subjected to various hydraulic and organic loadings, determination of the diffusion coefficients of oxygen transfer in microbial aggregates, and examination of phosphorus transport in a packed bed reactor. Experimental studies with biological filters using a variety of filter designs, media, and operational parameters to treat municipal and industrial wastes are described. Treatment costs for phosphorus removal by trickling filters, and for the use and construction of regional waste water treatment plants which may employ trickling filters, are discussed. Literature associated with the use of a rotating biological contactor as a type of biological filter is reviewed. (Schulz-FIRL)
W78-00027

MEAT-, FISH-, AND POULTRY-PROCESSING WASTES, (LITERATURE REVIEW),
Battelle Columbus Labs., OH.
J. H. Litchfield.
Journal Water Pollution Control Federation, Vol. 49, No. 6, p 1113-1118, June, 1977. 49 ref.

Descriptors: *Food processing industry, Canneries, *Fish handling facilities, *Poultry, *Organic wastes, Reviews, Industrial wastes, Recycling, Effluents, Waste water treatment.
Identifiers: Meat processing wastes, Fish processing wastes, Poultry processing wastes.

Literature pertaining to waste treatment and disposal for meat, fish, and poultry processing is reviewed. Aspects related to the treatment, disposal, and resource recovery of meat processing wastes are discussed, including cellulosic ion exchangers, chitosan recovery from shellfish wastes, microbial degradation, fat and protein recovery, dewatering, and waste separation techniques. Waste water treatment and disposal methods are reviewed with respect to fish and shellfish processing, including protein recovery, chitosan recovery, flotation and flocculation processes, and electrolysis. Effluent characteristics for poultry processing wastes are discussed. Sand filtration and granular activated carbon treatment are examined for treatment of chiller water from poultry chilling and scalding operations and from the final composite effluent are presented. Disposal methods of poultry wastes by land application and with anaerobic lagoons are discussed. (Schulz-FIRL)
W78-00028

FERMENTATION INDUSTRY, (LITERATURE REVIEWS),
Purdue Univ., Lafayette, IN.
C. P. L. Grady, Jr., and J. K. Grady.
Journal Water Pollution Control Federation, Vol. 49, No. 6, p 1123-1127, June, 1977. 44 ref.

Descriptors: *Food processing wastes, *Fermentation, *Yeasts, *Chemical wastes, *Alcohols, *Biological treatment, Industrial wastes, Fertilizers, Organic wastes, *Waste water treatment, Waste disposal.
Identifiers: Brewery wastes, Winery wastes, Pharmaceutical wastes, Distillery wastes, Alcohol production.

A series of articles on waste water treatment methods available to malting, pharmaceutical, and biochemical industries are reviewed. Various subjects related to the production of alcoholic beverages by breweries, distilleries, and wineries are examined, including waste water characteristics, biodegradation, biological treatment, chemical oxygen demand, and recovery and reuse of organic wastes. Topics related to Brazil's commercial alcohol industry, which produces ethanol from molasses obtained during cane sugar refining, are discussed, including color removal, waste composition, and land application as a means of waste disposal. Aspects of pharmaceuticals and biochemicals production which are discussed include operating experiences, COD removal, biological treatment, the use of pharmaceutical wastes for fertilizers, federal guidelines and effluent standards, and waste treatment processes. Results of a laboratory investigation to determine the technical feasibility of treating yeast plant waste water in a two-stage activated sludge system are discussed. (Schulz-FIRL)
W78-00029

REMOVAL OF COLOR FROM EFFLUENTS OF ANODIZING PLANTS,
Sandoz Ltd., Basel (Switzerland).
H. Grossmann.
Products Finishing, Vol. 41, No. 11, p 50-54, August, 1977.

Descriptors: *Dyes, *Dye concentrations, *Organic compounds, *Aluminum, *Color, Aluminum alloys, Separation techniques, Environmental effects, Color, Industrial wastes, *Waste water treatment.
Identifiers: Anodizing wastes.

Since some of the aluminum treated in anodizing plants is dyed by immersion in baths which contain organic dyes, anodizing plants must provide means of color removal before effluent can be discharged. Additional problems are posed because large volumes of highly concentrated dye liquors must be used, while relatively small amounts of dye are actually taken up by the aluminum. Toxicities and the effect of aluminum dyes on aquatic organisms and receiving waters are described. Since dyes are present in solution and are formulated to be resistant to biodegradation, removal in purification, plants is usually accomplished by adsorption or precipitation processes. Although aluminum dyes are retained in anion exchangers, they pass through cation exchangers. Dissolved dyes can be adsorbed or precipitated as hydroxides in a neutralization tank. Dye characteristics and the typical composition of used dye bath are discussed. Disadvantages to the use of chemical decomposition for decolorization are presented by the high concentrations of heavy metals which remain in the dye baths after dyes are removed. Concentration and separation of dyestuffs is hindered by the need for additional sludge and solid waste disposal facilities. Electrolytic oxidation, although efficient for decolorization, requires high initial investments and energy expenditure. (Schulz-FIRL)
W78-00030

POLLUTION-CONTROL PROCESS FOR HEAVY METALS IN PLATING RINSE WATERS.
Products Finishing, Vol. 41, No. 11, p 92-93, August, 1977. 1 tab.

Descriptors: *Heavy metals, *Industrial wastes, *Oxidation, *Equipment, Zinc, Copper, Lead, Chromium, Separation techniques, Effluents, *Waste water treatment.
Identifiers: Electroplating wastes, Metal wastes.

A Patented process for treating metal-containing plating rinse waters, the Nil-Metal Chemical Oxidation Reduction Process, has been produced by Automatic Medical Systems, Inc. of Minneapolis, Minnesota. The batch chemical destruct process has been used to remove copper, chromium, nickel, zinc, cyanide, cadmium, lead, tin, and silver from plating rinse waters. Results from a testing program with NI1-Metal Pollution Control Process are presented. Main features of the system include efficient reduction in metals concentrations with a range of tank sizes, minimum capital outlay, ease of operation, relatively short reaction time, and lower sludge volumes than for the usual hydroxide sludges. (Schulz-FIRL)
W78-00031

METAL RECOVERY MAKES GOOD SENSE,
Corning Glass Works, NY.
S. Bhatia, and R. Jump.
Environmental Science and Technology, Vol. 11, No. 8, p 752-755, August, 1977. 1 fig, 1 tab, 5 ref.

Descriptors: *Metals, *Separation techniques, *Industrial water, *Distillation, *Long-tube vertical distillation, Condensation, Industrial wastes, Chemical wastes, *Waste water treatment.
Identifiers: Climbing-film evaporators, Electroplating wastes, *Metals recovery.

Various aspects of resource recovery in the electroplating, metal, and plastics finishing industries are discussed. Since rinse water from plating operations may contain as much metal as is used in the process, the climbing film evaporator (CFE) is discussed as a recent development in metals recovery technology. Plating rinse water is vaporized by low-pressure steam and the concentrate is driven up into a vapor-liquid separator. The recovered solution is drained into a storage tank when its concentration has reached a predetermined level set by a concentration sensor controller. The distilled water can be reused in the rinsing process. Advantages in the use of the climbing film evaporator include reduced water use, lower costs for plating chemicals, and reduced labor costs in preparing plating solutions. Applications of the CFE system by General Plating in Detroit, Michigan; Ford Motor Company in Saline, Michigan; and Hudson Bay Diecastings Ltd in Bramalea, Ontario, are described. (Schulz-FIRL)
W78-00032

NORWEGIAN STEELWORKS INSTALLS LARGE MAGNADISC WASTE WATER CLEANING SYSTEM.
ASEA Journal, Vol. 50, No. 2, p 46, 1977.

Descriptors: *Steel, *Filters, *Flocculation, *Filtration, *Industrial wastes, *Treatment facilities, Water pollution control, Metals, Equipment, Separation techniques, *Waste water treatment.
Identifiers: Oslo(Norway).

Waste water from the blooming and wire rod mills at the Elkem-Spigerverket A/S steelworks in Oslo, Norway, will be treated by a MAGNADISC filter plant. A rotating magnetic disc filter which consists of an array of 45 thin, contra-rotating, circular discs is the major component of the system. Suspended matter and oil are first removed from the rolling mill waste water in a coarse settling tank. The remaining magnetic and non-magnetic particles are bound together with a flocculant additive. The MAGNADISC filters remove the sludge, leaving a residual solids concentration of about 30 g per cubic meter. The filtering system, which removes between 15 and 20 tons of mill scale per day from rolling mill waste water, has been installed at Elkem-Spigerverket to reduce the discharge of pollutants flowing into the Aker River. (Schulz-FIRL)
W78-00033

PEAT MOSS FILTER.
Water and Waste Treatment, Vol. 20, No. 6, p 52, 54, June, 1977.

Descriptors: *Filters, *Filtration, *Heavy metals, *Absorption, *Peat, Organic soils, Soil chemical properties, Separation techniques, Metals, Industrial wastes, Porous media, Chemical wastes, *Waste water treatment.
Identifiers: *Peat moss filters.

The use of peat moss to purify waste water containing heavy metals is being investigated at the

University of Sherbrooke in Canada. Preliminary studies have indicated that peat moss may have the ability to absorb metals such as copper, zinc, and mercury and that metals uptake is related to the acid content of the water. A pilot plant with a capacity of about 20,000 gallons of waste water per day was used to test the use of peat in the treatment of electroplating industry waste water which contained cyanide, cadmium, chromium, copper, nickel, and zinc. The plant included a peat moss filter, a device for spraying waste effluents, and a system for peat disposal. Filter construction involves grinding the peat moss and mixing it with water to form a 1% peat moss slurry. The slurry is pumped to an adjustable-speed moving screen belt to provide a one-inch-thick filter bed. Eight pipes suspended above the filter bed are used to spray chemically treated waste water over the bed. After saturation with heavy metals, the peat can be incinerated or used for landfill. (Schulz-FIRL)
W78-00034

BALANCED CARBONATE/BICARBONATE TREATMENT FOR PRECIPITATION OF TOXIC METAL WASTES,
Illinois Inst. of Tech., Chicago.
J. Patterson, and N. R. Barber.
Industrial Finishing, Vol. 53, No. 8, p 51-53, August, 1977. 1 fig.

Descriptors: *Carbonates, *Bicarbonates, *Hydrogen ion concentration, *Metals, *Chemical precipitation, Chemical reactions, Calcium carbonate, Industrial wastes, *Waste water treatment.
Identifiers: Metals precipitation, Hydrogen ion concentration control, Carbonate treatment.

Applications and advantages in the use of balanced carbonate/bicarbonate treatment for precipitation of toxic metal wastes are discussed. Advantages of the use of sodium bicarbonate include precipitation of a metal while holding the pH within a narrow range at nearly optimum levels, neutralization of excess acidity, and lower dispensing and sludge handling costs than for lime. Advantages of the use of sodium hydroxide to precipitate metals include ease of handling and application, precise pH control, and low sludge production. Although calcium carbonate is sometimes used in primary treatment, its slow dissolution results in better performance during batch processing than in a continuous system. The mixture of sodium bicarbonate with another suitable carbonate is suggested to enhance metals removal. With the addition of another carbonate, the pH is raised from 8.3 to 9, causing the precipitation of many more metals. Advantages of the bicarbonate/carbonate mixture include the steady system pH, in spite of varying levels of pH and metal in the effluent, and the precipitation of carbonate salts within a narrow pH range. Bicarbonate treatment is suggested as most cost-effective for industrial waste water treatment plants that treat 200,000 to 500,000 gallons of waste water per day. (Schulz-FIRL)
W78-00035

TINY DROPLETS CLEAN UP IN BIG SEPARATION JOBS.
Chemical Week, Vol. 121, No. 11, p 32, September, 1977.

Descriptors: *Membrane processes, *Separation techniques, *Metals, *Ammonium compounds, *Solvent extractions, Oil, Mining, Organic wastes, Industrial wastes, *Waste water treatment.
Identifiers: Liquid membranes.

Liquid membranes as complex emulsion systems have been developed at the Exxon Research Center in Linden, New Jersey, for use in kidney dialysis and for the removal of toxic ions from industrial waste water. The emulsion system is composed of an aqueous phase that is surrounded by an oil phase and stabilized by surfactants. A liquid membrane system which was developed by the Takuma Corporation in Osaka, Japan, under the direction of Exxon is also described. The Takuma system was adapted for removing toxic heavy metals and ammonia from municipal and industrial waste water. An ion trapping agent is dissolved in water and encapsulated by an oil phase which is composed of a surfactant dissolved in an 'isoparaffinic' solvent. Special ion carriers in the oil phase transport inorganic ions from the oil membrane into the aqueous phase. The system is capable of completing ion extraction and stripping in a single step and has been used in laboratory experiments to remove metal ion. Use of the liquid membranes for the extraction of metals from ores is currently being investigated. (Schulz-FIRL)
W78-00036

REMOVAL OF TOXIC METAL IONS FROM METAL-FINISHING WASTEWATER BY SOLVENT EXTRACTION,
Texas Southern Univ., Houston. Dept. of Chemistry.
C. W. McDonald, and R. S. Bajwa.
Separation Science, Vol. 12, No. 4, p 435-445, 1977. 3 tab, 13 ref.

Descriptors: *Solvent extractions, *Separation techniques, *Metals, *Nitrogen compounds, Chemical reactions, Zinc, Cadmium, Copper, Chromium, Sodium compounds, Heavy metals, Industrial wastes, *Waste water treatment.
Identifiers: Amines, Metal-finishing wastes.

Solvent extraction procedures using high molecular weight amines were investigated for the removal of chromium, cadmium, and zinc from metal-finishing waste water. The experiments investigated the extraction abilities of Primene JM-T, Primene 81-R, Amberlite AL-1, Alamine 336, and Aliquat 336-S with synthetic solutions of cadmium, chromium, copper, nickel, and zinc, and with metal-finishing waste water obtained from the Dixie Metal Finishing Plant in Houston, Texas. With a 25% Alamine 336-xylene solution as the extractant, chromium, cadmium, and zinc can be extracted selectively or simultaneously with a 100-to-1 aqueous phase:organic phase ratio. Stripping experiments with sulfuric acid, ethylenediamine, EDTA, and sodium hydroxide indicated that sodium hydroxide was the most efficient stripping agent, with removal of more than 99.5% of the chromium, cadmium, and zinc from the organic phase with 4 M NaOH in single stripping operation. An evaluation of reagent life and regeneration indicated that a regenerated Alamine 336-xylene solution could be reused for as many as 15 cycles without loss of extraction efficiency. The reaction mechanisms by which metals are extracted from metal finishing waste water are described. (Schulz-FIRL)
W78-00037

CHROMIC ACID DECATIONISER.
Water and Waste Treatment, Vol. 20, No. 7, p 47, July, 1977.

Descriptors: *Separation techniques, *Metals, *Ion exchange, *Cation exchange, Acids, Industrial wastes, Acidic water, Chemical wastes, Liquid wastes, *Waste water treatment.
Identifiers: *Chromic acid decationizer.

The Canadian Eco-Tec Decationizer is suggested for the removal of cationic metallic contaminants such as trivalent chrome, nickel, zinc, copper, iron, and aluminum from chromic acid-based solutions used in electroplating, anodizing, chrome plating, and etching. Treatment of the solutions can eliminate costs and hazards associated with disposal, as well as improve operations and possibly allow for reuse of the solutions. The Eco-Tec Decationizer uses the patented Reciprocating Flow Ion Exchange process and other design and equipment innovations, and may provide a viable alternative to the usually costly and complicated means of contaminant removal from chromic acid solutions. (Schulz-FIRL)
W78-00038

NEW TECHNOLOGY FOR BOILER FEED AT MOBIL,
J. B. Leather.
Effluent and Water Treatment Journal, Vol. 17, No. 6, p 279-282, 285, June, 1977. 5 fig, 2 tab.

Descriptors: *Oily water, *Oil wastes, *Demineralization, *Ion exchange, *Separation techniques, Conductivity, Silica, Cation exchange, Anion adsorption, *Boiler feed water, Filters, Filtration, Treatment facilities, Boilers, Equipment, *Waste water treatment.
Identifiers: Coryton(Essex United Kingdom).

Expansions of the waste water treatment facilities at the Mobil oil Company Refinery at Coryton, Essex, England, are described. Initial plans for the facilities included cation, degassing, strong base anion and mixed bed stages to produce an effluent which was low in silica and conductivity. The demineralization plant includes three cation and three strong base anion exchange units which were arranged for counter-current regeneration, and an atmospheric degasser. The plant is designed to treat a total maximum flow rate of 544 tons/hr. In the counter-current regeneration technique waste water passes through the ion exchange resin in a downward direction while regenerant passes in an upward direction. Requirements of the system include the use of cation-free water for regenerant chemical dilution and maintenance of the resin bed in a completely compact, undisturbed state. The regenerant collector contains a header and lateral system at the top of the resin bed. Further details on regenerant production, storage, and transfer are presented. Coalescing filters and candle-type pre-coat filters are used to produce a suitable refinery condensate for feeding to the boilers. Mechanical, electrical, and civil engineering work for the Coryton facility is being done by Degremont Laing Ltd. (Schulz-FIRL)
W78-00039

ACTIVATED CARBON IMPROVES EFFLUENT QUALITY IN REFINERY SLUDGE PROCESS,
Amoco Oil Co., Texas City, TX.
C. G. Grieves, M. K. Stenstrom, J. D. Walk, and J. F. Grutsch.
Industrial Wastes, Vol. 23, No. 4, p 30-35, July/August, 1977. 6 fig, 10 tab, 8 ref.

Descriptors: *Chemical wastes, *Activated sludge, *Activated carbon, *Oil wastes, *Nitrification, Aeration, Pilot plants, Industrial wastes, Sludge treatment, Chemical oxygen demand, Phenols, Particle size, *Waste water treatment.

The effects of the addition of powdered activated carbon to the aeration section of an activated sludge process for refinery waste water treatment were investigated with pilot plant experiments conducted in three phases at the Amoco Texas City refinery. The experiments used modified activated sludge reactors in which sludge from the sludge blanket flowed by gravity back into the aeration zone. The first two phases of the program investigated enhancement of treatment by the addition of high doses of carbon (100 and 200 mg/liter) for the removal of soluble organic carbon, soluble COD, NH3-N, and phenolics. A newly-developed high surface area carbon was used in the third phase of the study. Results indicated that the addition of activated carbon to the activated sludge process significantly improved effluent characteristics. A comparison in effectiveness of the types of carbon used in the studies indicated that performance was better and less carbon was required when a higher surface area carbon was used. The high surface area carbon developed for the program was twice as effective as the best commercially available carbon tested.

Prefiltration and operation at a high sludge age (60 days) also improved pilot plant effluent quality. (Schulz-FIRL)
W78-00040

MEETING BPT STANDARDS FOR REFINERY WASTEWATER TREATMENT.
Engineering-Science, Inc., Pasadena, CA.
Industrial Wastes, Vol. 23, No. 4, p 20-25, July/August, 1977. 5 fig, 5 tab, 5 ref.

Descriptors: *Oil wastes, *Chemical wastes, *Oily water, *Separation techniques, *Federal Water Pollution Control Act, Filtration, Biological treatment, Hydrogen ion concentration, Water quality standards, Liquid wastes, *Waste water treatment.
Identifiers: Petrochemical wastes, Stripping, pH control, API separators, Tilted plate separators.

Best practicable treatment for petroleum refineries and petrochemical plants has been defined by the EPA as biological treatment combined with post-filtration. Such treatment is required of all existing industrial dischargers by July 1977. Methods of primary treatment which are applicable to petroleum industries include API separators, tilted plate separators, filtration, pH control, and stripping processes. Intermediate processes include dissolved air flotation, coagulation-precipitation, and equalization. Secondary/tertiary treatment processes include activated sludge, chemical oxidation, and filtration. The characterization of treatment needs according to pollutant sources, such as normal process operations, utility operations, sanitary sewage, contaminated storm runoff, ballast water blowdown, and miscellaneous discharges, is suggested. Typical applications and advantages are discussed for primary treatment processes for oily wastes. (Schulz-FIRL)
W78-00041

CHEMICAL RECOVERY SYSTEM CHECKS POLLUTION.
Modern Power and Engineering, Vol. 71, No. 6, p 32-34, June, 1977. 1 fig.

Descriptors: *Incineration, *Carbonates, *Pulp wastes, *Oxidation, *Dewatering, *Drying, Pulp and paper industry, Industrial wastes, Treatment facilities, Chemical wastes, Waste disposal, *Waste water treatment.
Identifiers: Fluidized bed reactors, Sodium carbonate recovery.

The Papier Cascades (Cabano) Inc. pulp and paper mill in Cabano, Quebec, has begun using a $2 million chemical recovery system to treat spent liquor from the plant's daily production of 200 tons of corrugating medium. The Copeland system contains a fluidized bed reacotr for the combustion of spent liquor to oxidize organic pulping residue and recover sodium carbonate and sodium salts. Spent liquor which has been concentrated in a direct contact venturi-type evaporative scrubber is injected into the upper freeboard zone of the 22-ft diameter fluidized bed reactor. Water is evaporated from the concentrate by gases at a temperature of about 1200F. Sodium hydroxide in the dried liquor solids is converted into sodium carbonate to form a pelletized bed material. Withdrawal of the granular bed product through a nozzle in the side of the reactor is controlled by a variable speed rotary valve. The sodium carbonate is recycled through the pulp mill. The direct contact venturi scrubber/evaporator cools and cleans hot exhaust gases from the reactor while evaporating liquid from the weakly concentrated liquor. The system is automatically controlled through a central control room. (Schulz-FIRL)
W78-00042

GREAT LAKES PAPER LAUNCHES THUNDER BAY PULP MILL.
Paper, Vol. 188, No. 1, p 18-20, July, 1977.

Descriptors: *Pulp and paper industry, *Pulp wastes, *Chemical wastes, *Biochemical oxygen demand, *Treatment facilities, Bleaching wastes, Industrial wastes, Water pollution control, *Waste water treatment, *Canada, Lake Ontario.
Identifiers: Thunder Bay(Ontario Canada).

Operations of a closed cycle, bleached softwood kraft market pulp mill in Thunder Bay, Ontario, Canada, are described. The Rapson-Reeve closed cycle process was designed for the Great Lakes Paper Company under a $1.2 million contract from Environment Canada's Demonstration and Design of Pollution Abatement Technology Program. The new bleached kraft pulp mill which is designed to handle 3,000 cords of wood per day includes a Kamyr continuous digester with a capacity of 800 t/day and 3.5 hours of in-digester washing, a two-stage diffuser washer, a five-stage bleach plant with countercurrent washing in both bleach plant and brownstock washing, and extensive cleaning of both brownstock and bleached pulp with 1,054 Noss cleaners. The closed cycle process involves transport of the effluent from the bleach plant into the pulping operations for reuse and subsequent chemicals recovery. The Rapson-Reeve process is designed to totally remove BOD by chemical rather than biological processes. Color and toxicity are also reduced in the process. Information on the design and operation of the continuous digester, the bleach plant, countercurrent washing, and the pulp machine is presented. Goslin-Birmingham salt liquor evaporators filter out sodium chloride in the recausticizing system. A spill system which consists of underground collection tanks for acids, alkalis, and fiber prevents accidental discharge from the mill. (Schulz-FIRL)
W78-00043

DEWATERING PAPER MILL SLUDGE.
Water Services, Vol. 81, No. 976, p 344, June, 1977.

Descriptors: *Filters, *Dewatering, *Pulp wastes, *Pulp and paper industry, *Clarification, *Separation techniques, Equipment, Filtration, Industrial wastes, *Waste water equipment.

British Tissues Ltd is using two string discharge rotary-drum vacuum filters manufactured by Stockdale Engineering Ltd of Cheshire, England, to dewater paper mill effluent. The mill uses approximately 1.5 million gallons of water daily, which is ultimately discharged along with paper fiber and clay. Screening is used to recover much of the fiber and the residue is passed on to an effluent treatment plant. Small particles are settled in a clarifloculator to which polyelectrolytes are added. The Stockdale filters are used to dewater the resulting thickened clarifier underflow. The Stockdale units produce a filter cake with a solids content of approximately 20%. The stainless steel Stockdale filters are equipped with a string discharge for the relatively thin, sticky filter cakes. The filtration areas of the two filters used by British Tissues Ltd are 5.85 and 13.27 sq m. (Schulz-FIRL)
W78-00044

MISSISSIPPI PAPER MILL SETS EXAMPLE.
Water and Wastes Engineering, Vol. 14, No. 7, p 29, July, 1977.

Descriptors: *Pulp wastes, *Pulp and paper industry, *Aeration, *Settling basins, Oxygenation, Biochemical oxygen demand, Treatment facilities, *Waste water treatment, Mississippi.
Identifiers: Moss Point(MS).

Effluent treatment at the International Paper Company's Moss Point paper mill in Jackson County, Mississippi, is described. The secondary waste water treatment facility for processing 28 mgd was approved for development in 1971 and engineering services were provided by Michael Baker, Jr., Inc. Relocation of a portion of the Escatawpa River by dredge construction of a new channel and closure of the natural channel with a sand core dike was required in construction of the facility. A 60-acre, aerated waste water stabilization basin constructed of dredge-filled earthen dikes retains the average waste water flow of 28 mgd from the paper mill's primary clarifier for 8 days. An oxygen transfer of 2.17 lbs per horsepower-hour is supplied by 22 floating mechanical aerators. Nitrogen is added to the waste at a rate of 2 lbs per 100 lbs of BOD to satisfy nutrient requirements and promote the growth of microorganisms. (Schulz-FIRL)
W78-00045

RAYONIER'S $76-MILLION POLLUTION CONTROL PROJECT FOR SULFITE PULPING STARTS UP IN FLORIDA.
Paper Trade Journal, Vol 161, No 9, p 23, May, 1977.

Descriptors: *Pulp and paper industry, *Pulp wastes, *Treatment facilities, *Industrial wastes, Incineration, Water pollution control, Clarification, Energy, Costs, *Waste water treatment, Florida.
Identifiers: Fernandina Beach(FL).

New facilities at the ITT Rayonier sulfite pulp mill in Fernandina Beach, Florida, will be used to treat cooking process wastes which previously had been discharged into the ocean directly or via the Amelia River. Wastes from the processing of southern pine, a highly resinous wood, at the Fernandina facility required special processes other than conventional ones used in handling kraft mill wastes. The $76 million pollution abatement program includes the recovery of heat and processing chemicals for re-use. Liquid wastes from primary cooking operations are concentrated by evaporation and sent to a recovery furnace and boiler for incineration. A spray mist scrubber is used to remove potential air pollutants from gases produced in the burning process and to recover processing chemicals. Usable bleaching wastes are burned at the company's kraft pulp mills in Jesup, Georgia. After a 210-ft diameter clarifier removes grit and unusable wood fibers from the mill waste water, the solids are incinerated or transported to a landfill. Clarified effluent is retained in a 33-acre aeration lagoon before discharge through a diffuser into the Amelia River. (Schulz-FIRL)
W78-00046

NITRIFICATION DESIGN APPROACH FOR HIGH STRENGTH AMMONIA WASTEWATERS,
Associated Water and Air Resources Engineers, Inc., Nashville, TN.
C. E. Adams, Jr., and W. W. Eckenfelder, Jr.
Journal Water Pollution Control Federation, Vol 49, No 3, Part 1, p 413-421, March, 1977. 7 fig, 11 ref.

Descriptors: *Nitrification, *Ammonia, *Mathematical models, *Oxygen requirements, *Design criteria, Oil wastes, Pulp wastes, Phenols, Organic wastes, Chemical wastes, Oil industry, Pulp and paper industry, Industrial wastes, *Waste water treatment.

The use of nitrification for ammonia removal from high-strength waste waters was investigated, and design coefficients needed for estimating detention times and oxygen requirements for nitrification with the activated sludge process were generated. Basic concepts and mechanisms associated with the biological conversion of ammonia to nitrate were discussed. Proposed design models to correlate detention time and oxygen requirements to the amount of nitrification desired included: a model which described the oxidation of ammonia in terms of ammonia concentration, detention time, and overall nitrification rate coefficient; and an oxygen utilization model which related total oxygen required to BOD removed,

amount of oxygen used for synthesis, and oxygen required for endogenous activities. The validity of the models was tested in laboratory and pilot studies with activated sludge systems using three types of industrial wastes, including pulp and paper waste water, refinery waste water, and phenolic waste water. The studies indicated that the models were applicable to both a single-stage and a two-stage nitrification process and that high sludge ages were required for nitrifying high concentrations of ammonia. Design considerations on oxygen requirements, limitations of biological nitrification, and modification to the activated sludge process are discussed. (Schulz-FIRL)
W78-00047

ALTERNATIVES FOR BIOLOGICAL WASTE TREATMENT OF DYE WASTEWATERS,
Tennessee Univ., Knoxville. Dept. of Environmental Engineering.
D. W. Weeter, and A. G. Hodgson.
American Dyestuff Reporter, Vol 66, No 8, p 32, 34, 36, 38, 61, August, 1977. 2 fig, 9 tab, 6 ref.

Descriptors: *Dyes, Color, *Biodegradation, *Activated sludge, *Adsorption, *Chemical wastes, Oxygen requirements, Waste assimilative capacity, Textiles, Industrial wastes, Suspended solids, *Waste water treatment.
Identifiers: *Color removal.

Alternative methods of treatment of dye waste waters from textile mills are reviewed. Laboratory studies were used to investigate the degradability of six dyes as measured by oxygen uptake, with specific emphasis on color reduction as the main goal of treatment. The absorptive capacities of acclimated and non-acclimated sludges for the six dyes were examined. Studies indicated that oxygen uptake by each of the dyes was limited, and no effective removal of color or change in hue was observed over a 25-day incubation period at 20C. Slight nitrogenous oxygen uptake was indicated, but there was no significant change between the carbonaceous and the total oxygen uptake. In the second phase of the study, possible color removal and organic loading by adding mixed liquor suspended solids to the dyes was investigated. A floc which exhibited poor settling characteristics was produced when acclimated mixed liquor suspended solids were added to the dye solution. Chemical oxygen demand and measured color were higher for the treated dye solutions than for untreated solutions. In the third phase of the study, color reduction by the addition of non-acclimated mixed liquor suspended solids to dye solutions was investigated. Results were similar to those obtained for acclimated solids. The degree of color reduction with the addition of MLSS ranged from 25 to 40% and varied with type of dye. The degree of color reduction was not significantly affected by the length of contact time. (Schulz-FIRL)
W78-00048

SLUDGE DEWATERING IN TEXTILE PLANTS,
Kendall Co., Griswoldville, MA.
C. Cole, S. Corr, and J. Albert.
American Dyestuff Reporter, Vol 66, No 8, p 30-31, 61, August, 1977. 4 fig, 2 tab, 6 ref.

Descriptors: *Dewatering, *Bleaching wastes, *Textiles, *Sludge treatment, *Centrifugation, Separation techniques, Filtration, Suspended solids, Polymers, Treatment facilities, Pilot plants, Industrial wastes, *Waste water treatment, Massachusetts.
Identifiers: Griswoldville(MA).

Weston and Sampson Engineers of Boston, Massachusetts, were contracted to develop a program for waste activated sludge dewatering at the Kendall Company textile bleaching plant in Griswoldville, Massachusetts. The 1 million gallons of waste water generated at the plant each day are low in suspended solids and commonly contain BOD in the range of 500-600 mg/liter. A three-day modified extended aeration activated sludge process reduces the BOD of screened waste water by 95%. Gravity settling is used to clarify mixed liquor to a waste activated sludge solids content of 0.5-0.7%. A mechanical sludge dewatering system was installed to reduce odor problems associated with sludge holding lagoons. Vacuum filtration, centrifugation, and pressure filtration were evaluated as means of sludge dewatering. Laboratory tests at Ingersoll-Rand in Nashua, New Hampshire, indicated that a countercurrent flotation separator (CFS) in combination with a slow-speed Kruger centrifuge was the best means for dewatering the difficult sludge. Microsize bubbles which rise countercurrent to the raw sludge entering the CFS combine with flocculated particles to form a sludge blanket at the top of the unit. Studies on polymer dosages indicated that a dosage of approximately 11.5 lb per dry ton of solids resulted in the greatest solids recovery. The sludge dewatering system, which includes a dual polymer system, a sludge holding tank, sludge pumps, and a compressed air distribution system, is designed to thicken and dewater 1300 lb of sludge daily over a 31-hour week of operation. (Schulz-FIRL)
W78-00049

PROSPECTS FOR WATER RE-USE,
Shirley Inst., Manchester (England). Finishing Div.
G. J. Parish.
American Dyestuff Reporter, Vol 66, No 8, p 27, 29, 52, August, 1977. 1 tab.

Descriptors: *Textiles, *Water reuse, *Water utilization, *Impaired water use, Industrial wastes, Costs, Sewage treatment, Tertiary treatment, *Waste water treatment.

Various aspects of the reuse of waste water for industrial purposes are discussed. Multiple usage of water is suggested to reduce total water intake, save water costs, provide a water source where supplies of raw water are limited, and reduce the total amount of effluent to be discharged. The degree of ability to reuse water within a given industry depends on the nature of the industry, process waste water characteristics, and process water quality requirements. Aspects of waste water treatment systems to be considered include adaptability, versatility, resilience, cost, energy, ease of operation, and current plant size. Waste water treatment systems are evaluated with respect to producing an effluent for reuse in the textile industry. Treatment methods which are examined include conventional biological treatment, flocculation, activated carbon, ion exchange, pretreatment, direct catalytic oxidation, reverse osmosis, and multi-stage evaporation. (Schulz-FIRL)
W78-00050

WASTE WATER TREATMENT AND WATER RECYCLING.
International Dyer and Textile Printer, Vol 157, No 10, p 478. May 13, 1977.

Descriptors: *Water reuse, *Vapor compression distillation, *Heat transfer, *Textiles, *Recirculated water, Reclamation, Energy, Industrial wastes, Industrial water, *Waste water treatment.

The IBK waste water treatment and water recycling method, designed by IBK Koeppl of West Germany, has been used by textile manufacturers in response to increasing costs of water and waste water treatment. Based on the principle of regenerating vaporization, the process treats effluent and recovers process substances. Steam produced during vaporization can also be used in heat-consuming equipment used in textile finishing. The high-quality distilled effuent can be used immediately in the power or water supply cycles. Vaporization removes all dyestuffs, turbidity, mechanical impurities, salts, and alkalis. Additional treatment with activated carbon can qualify the regenerated water for other industrial uses. The remaining concentrate can be treated in a combustion chamber to burn off the hydrocarbons and separate out the dried salts. Heat recovery by the IBK recycling system lowers total energy costs for textile waste water treatment. Automatic controls for effluent input and for physical variables are included in the IBK system. (Schulz-FIRL)
W78-00051

TEXTILE WASTES, (LITERATURE REVIEW),
Talbot (Richard S.) and Associates, Media, PA.
R. S. Talbot.
Journal Water Pollution Control Federation, Vol 49, No 6, p 1161-1163, June, 1977. 13 ref.

Descriptors: *Textiles, *Industrial wastes, *Activated carbon, *Dyes, *Chemical wastes, Activated sludge, Chemical oxygen demand, Suspended solids, Filtration, Color, Water utilization, *Waste water treatment, *Bibliographies, *Reviews.

Literature pertaining to the treatment of wastes resulting from the manufacture of textiles is reviewed. Treatment processes discussed include ultrafiltration, biological filtration, activated sludge, flocculation, chemical treatment, activated carbon, and sludge dewatering. Studies on the removal of grease, suspended solids, and chemical oxygen demand from wool scouring liquors are described. Methods of water conservation during textile dyeing are presented. Treatment of combined municipal and industrial wastes with activated sludge processes is discussed. Chemical treatment of textile dye and finishing wastes with lime, alum, or activated carbon treatment is examined. Pollutants found in waste water resulting from the manufacture of tufted textiles for rugs and carpets are described. (Schulz-FIRL)
W78-00052

PROBLEMS IN PUBLIC SEWAGE TREATMENT PLANTS CAUSED BY SIZING BATHS AND POSSIBILITIES FOR SOLVING THEM (SCHWIERIGKEITEN IN OEFFENTLICHEN KLAERANLAGEN DURCH SCHLICHTEREIABWAESSER UND MOEGLICHKEITEN ZU IHRER BEHEBUNG),
HABIS TEXTIL A.G., Flawil (Switzerland).
R. Tanner.
Textilveredelung, Vol 12, No 6, p 241-243. 4 fig.

Descriptors: *Textiles, *Organic wastes, *Municipal wastes, *Industrial wastes, Sludge treatment, Retention, Biological treatment, *Waste water treatment.
Identifiers: Textile sizing wastes, Combined wastes.

Sizing bath effluents with high organic matter and organic carbon content caused disturbances in the operation of a municipal biological waste water treatment plant providing for a transit time of 4-4.5 hr for the waste water. The sizing effluents from the textile finishing plant, up to 800 liters/day, increased the sludge index and the discharge of finely dispersed sludge and coagulated matter. The sizing effluents contained native starch, modified starch derivatives, carboxymethylcellulose, polyacrylates, digesting agents for starch, fats, and waxes. For all these compounds, which are difficult to degrade, the transit time of 4-4.5 hrs was too short. The problem was solved by replacing the sizing bath collection tank by a discharge pipeline to prevent fermentation, by increasing the storage life of the sizing baths, and by the reuse of used baths. These measures resulted in a 28% drop in the sizing bath discharge. (Takacs-FIRL)
W78-00053

WATER RECYCLING-NO WASTE WATER TO SEWAGE TREATMENT PLANTS (RECYCLING

FUER WASSER - KEIN ABWASSER AN KLAERANLAGEN).
Das technische Umweltmagazin, No 5, p 43-44, 1977. 3 fig.

Descriptors: *Textiles, *Water reuse, *Distillation, *Separation techniques, *Recycling, Evaporation, Treatment facilities, Costs, Salts, Energy, Industrial wastes, *Waste water treatment.

A new recycling system developed by Ingenieurburo Koppl, Tubingen, West Germany, for the treatment and recycling of waste waters generated in textile finishing operations by regenerative evaporation is described. Evaporation is done under elevated pressure, and the distillate is of highest purity. The extra cost of evaporation is minimal, because the heat necessary for the technological process is used. The residue is concentrated to 50% and incinerated to obtain dry salts as a residue. (Takacs-FIRL)
W78-00054

ZINC RECOVERY FROM RAYON PLANT SLUDGE,
Avtex Fibers, Inc., Front Royal, VA.
L. B. Bowen, J. H. Mallinson, and J. H. Cosgrove.
Chemical Engineering Progress, Vol 73, No 5, p 50-54, May, 1977. 2 fig, 2 tab.

Descriptors: Zinc, *Textiles, *Fabrics, *Sludge treatment, *Chemical reactions, Iron, Acids, Neutralization, Construction materials, Costs, Operation and maintenance, Industrial wastes, *Waste water treatment, Recycling.
Identifiers: *Zincc recovery, Rayon manufacturing wastes.

A process for recovering zinc hydroxide and other solids from rayon plant sludge is being used at Avtex Fibers, Incorporated, in Front Royal, Virginia. Twenty-three possible recovery methods have been investigated during the 27 years of operation, including 15 general methods: crystallization; drying, roasting, and calcining; drying and smelting; electrolysis of zinc from zinc sulfate solution; ion exchange; H2S precipitation; sodium hydroxide extraction; two-stage precipitation using lime and NaOH, Na2CO3, or Na2S; flash drying; concentrating sludge with centrifuges; electrodialysis; solution mining; flotation; solvent extraction; and harvesting dry zinc sludge. The seven step process incorporated in the new treatment facilities involves mining, heat treatment to convert amorphous sludge to a filterable crystalline material, pressure filtration, acid digestion, pressure filtration for purifying the zinc sulfate product, and an iron removal step. Problems associated with construction materials are described. Chemical and utility consumption quantities required per pound of zinc recovered are given. Startup problems encountered with sludge mining and composition, filter press operation, and filter press cloth design are descibed. (Schulz-FIRL)
W78-00055

NEW PLANT FILTERS 400 GAL/MIN. OF MINE WATER.
Filtration and Separation, Vol 14, No 4, p 414, July/August, 1977. 1 fig.

Descriptors: *Coal mine wastes, *Iron compounds, *Flocculation, *Dewatering, *Mine drainage, Mine wastes, Filters, Filtration, Aeration, Recirculated water, Industrial wastes, *Waste water treatment.

The continuously operating, nearly automatic mine water treatment plant at the Silverdale Colliery at Newcastle-under-Lyme near Stoke-on-Trent in England is described. Designed by coal preparation engineers of the National Coal Board in conjunction with Simon Hartley of Stoke-on-Trent, the plant was commissioned to reduce the iron content of 2600 cu m/day of mine water from 200 ppm to less than 2 ppm. After aeration of the waste water, lime in the form of a slurry is mixed with the waste water in a reaction tank. Polyelectrolyte is manually dosed to the turbid water in two NCB deep-cone thickening tanks. Settled sludge is periodically released by gravity into a sludge collection tank and clear effluent flows into wiers at the top of the NCB tanks. A sludge cake with a final water content of 35% and a solids composition of 65% CaO and 16% Fe2O3 is produced by a 110 sq ft Stockdale Engineering Ltd rotary-drum, belt-discharge vacuum filter with cloth washing and air blow discharge facilities. The clear treated effluent is used to wash mine surfaces, and the remainder is diluted with iron-free water from the mine shaft. The large slurry holding tank allows flow balancing and system shutdown during periods of low flow. (Schulz-FIRL)
W78-00056

UNIQUE AUTOMATIC WATER-TREATMENT PLANT AT SILVERDALE COLLIERY.
The Mining Engineer, Vol 136, No 194, p 569-570, July, 1977. 1 fig.

Descriptors: *Coal mine wastes, *Iron compounds, *Water treatment, *Flocculation, *Dewatering, Lime, Iron oxides, Filters, Aeration, Mine drainage, Mine wastes, Recirculated water, Acid mine water, Industrial wastes, *Waste water treatment.

An automatic, continuously-operating water treatment plant at the Silverdale coal mine at Newcastle-under-Lyme near Stoke-on-Trent in England is described. The system is designed to reduce the iron content of 2600 cu m/day of ochreous mine water. The waste water is aerated and a slurry of 100 ppm lime is added to the waste water in a reaction tank. Polyelectrolyte is added to the turbid water in two NCB deep-cone thickening tanks equipped with weirs for clear water overflow. Settled sludge is periodically released by gravity into a sludge collection tank. A 110 sq ft Stockdale Ltd rotary-drum, belt-discharge vacuum filter with cloth washing and air blow discharge facilities dewaters the sludge to a final water content of 35%, producing a dry filter cake with a solids composition of 65% CaO and 16% Fe2O3. A portion of the clear effluent is used to wash the mine surfaces and the remainder is mixed with iron-free water from the mine shaft. Advantages to the use of the system include its nearly automatic operation and small space requirements relative to conventional oxidation lagoons used in the treatment of mine waters. (Schulz-FIRL)
W78-00057

NCB WATER TREATMENT PLANT NEEDS NO LAGOONS.
Coal Age, Vol 82, No 7, p 21, July, 1977.

Descriptors: *Iron, *Mine drainage, *Acid mine water, *Lime, *Treatment facilities, Coal mines, Coal mine wastes, Liquid wastes, Sludge treatment, Dewatering, Filtration, Flocculation, Industrial wastes, *Waste water treatment.

An automatic water treatment plant is being used at the Silverdale coal mine in England to treat 400 gpm of iron-containing mine waters. The automatic treatment plant produces a filter cake with a water content of 35% and eliminates the need for conventional settling lagoons. Mine water is pumped from a 250,000 gal holding tank with a capacity sufficient to hold 10 hr of flow to a reactor tank equipped with a Simcar aerator. A lime slurry is pumped into the reactor tank at a rate of 100 lb/min while the aerator supplies oxygen at a rate of 9.5 kg/hr. The turbid waste water is then mixed with a polyelectrolyte flocculant in two NCB deep-cone thickening tanks in which the iron content is reduced to 3 ppm. Clear effluent which overflows to a holding tank is routed back to the mine, and sludge is periodically drawn from the tanks through a butterfly valve. The thickened sludge which has a water content of approximately 60% is further dewatered with a rotary belt vacuum filter to a final water concentration of about 35%. Effluent which is not reused in mine operations is diluted with other iron-free water from Silverdale shafts. The large capacity of the holding tank allows the plant to treat waste water on an intermittent basis. (Schulz-FIRL)
W78-00058

STUDY EXAMINES WASTE DISPOSAL AT PITTSBURGH PLANTS,
Westinghouse Research Labs., Pittsburgh, PA.
For primary bibliographic entry see Field 5E.
W78-00060

PRETREATMENT STRATEGIES FOR INDUSTRIAL WASTE CONTROL PROPOSED BY EPA,
For primary bibliographic entry see Field 5G.
W78-00061

GUIDE TO WASTEWATER TREATMENT: BIOLOGICAL-SYSTEM DEVELOPMENTS,
Engineering-Science, Inc., Austin, TX.
D. L. Ford, and L. F. Tischler.
Chemical Engineering, Vol 84, No 17, p 131-135, August, 1977. 2 fig, 13 ref.

Descriptors: *Biological treatment, *Industrial wastes, *Activated sludge, *Trickling filters, *Biodegradation, Equalizing reservoirs, Organic loading, Dilution, Solvent extractions, Suspended solids, Design criteria, Nitrification, Filtration, *Waste water treatment.

High-rate biological treatment systems such as activated sludge, trickling filters, and rotating discs are reviewed for use in municipal and industrial waste water treatment. Various aspects of suspended-growth systems such as the completely-mixed activated sludge process are discussed, including contact stabilization, solids removal, and effluent polishing. Fixed-growth systems such as the conventional trickling filter and the rotating biological filter are described and compared with suspended-growth systems. Flow equalization and auxiliary basins in industrial waste water treatment are suggested to offset problems associated with hydraulic- and organic-load variations to biological systems. Pretreatment with hydrolysis is suggested to enhance biodegradability. Pre-dilution of influent streams having high organic concentrations by streams having low organic concentrations is suggested to improve overall performance of a biological system. Steam or solvent stripping of industrial waste streams is recommended to reduce high-organic loads, minimize loading variations, and reduce inhibition of biological processes by particularly toxic wastes. Increasing the amount of biological solids in the aeration basin of suspended growth systems by increasing the sludge-recycle ratio and/or reducing sludge wastage is reported to prevent biological upset. Various processes used in the removal of secondary solids are discussed. Design and operational variables which can affect process performance are discussed, including sludge age, temperature, sludge bulking, nitrification, and activated carbon treatment. (Schulz-FIRL)
W78-00062

ELETROMAGNETIC PISTON PUMP.
For primary bibliographic entry see Field 8C.
W78-00063

COOLING-WATER CALCULATIONS,
Air Products and Chemicals, Inc., Allentown, PA.
For primary bibliographic entry see Field 5B.
W78-00064

OILY WASTE TREATMENT SYSTEM.
Professional Engineer, Vol 47, No 8, p 47, August, 1977.

Descriptors: *Separation techniques, *Suspended solids, *Industrial wastes, *Clarification, Equipment, Aeration, Coagulation, Colloids, *Waste water treatment, *Oil wastes.

The Favair dissolved air flotation system treatment process was designed by the Permutit Company for the separation of suspended solids and colloidal materials from industrial wastes such as food processing, pulp and paper processing, latex manufacturing, biological and oily wastes. Air at 50 psi is added to the waste liquid in a retention tank which may have received prior treatment with polyelectrolytes for coagulation. When the air-saturated liquid is released to atmospheric pressure in the flotation tank, the dissolved air comes out of solution and forms microscopic bubbles. Suspended particles adhere to the surface of the rising bubbles and are carried to the surface. They are then removed by scrapers, leaving clarified water at the bottom of the tank. (Schulz-FIRL)
W78-00066

AGRICULTURAL USE OF SEWAGE SLUDGE: PROBLEMS OF INDUSTRIAL EFFLUENTS (LANDWIRTSCHAFTLICHE VERWERTUNG VON KLAERSCHLAMM: PROBLEME DURCH INDUSTRIEABWAESSER),
Eidgenoessische Forschungsanstalt fuer Agrikulturchemie und Umwelthygiene, Bern (Switzerland).
For primary bibliographic entry see Field 5E.
W78-00067

NEED FOR NEW AND BETTER MEMBRANES,
Office of Water Research and Technology, Washington, D.C. Membrane Processes Div.
For primary bibliographic entry see Field 3A.
W78-00069

PHOSPHATE REMOVAL BY SANDS AND SOILS,
New York State Dept. of Environmental Conservation, Albany. Research Unit.
T. J. Tofflemire, and M. Chen.
Ground Water, Vol 15, No 5, p 377-387, September-October 1977. 6 fig, 13 tab, 31 ref.

Descriptors: *Unsaturated flow, *Laboratory tests, *Waste water disposal, *Recharge, Filtration, *Phosphates, Soil characteristics, Infiltration, Soil profiles, Soils, Sands, Waste disposal, Water quality, Filters, Soil filters, Adsorption, Analytical techniques.
Identifiers: Isotherm test, *Phosphate removal.

Phosphate retention by soils is especially important for tile fields and rapid infiltration systems near lakes where eutrophication is a problem. The use and application of the phosphate adsorption isotherm test to estimate a soil's phosphate removal ability was discussed. It was found that in New York State, the till soils had a greater phosphate retention ability than the outwash soils. Within the tills and within the outwashes, the more acid soils had a greater phosphate retention than the more basic or calcareous soils. The B horizon of many of the soils had a high phosphate capacity. However, this is often neglected in rapid infiltration systems because the waste water is discharged below the B horizon. The phosphate removal in column studies and field studies in rapid infiltration systems was found to be greater than predicted by the rapid isotherm test. Instermittent sand filters with 2 ft sand and underdrains were found to have a limited ability to remove phosphate. A substantial portion of slowly fixed phosphate is non-leachable by rain water. Methods to predict and design for phosphate retention by sands and soils were described. (Humphreys-ISWS)
W78-00092

CHARACTERISTICS OF WASTE WATERS FROM PACKINGHOUSES,
Marquette Univ., Milwaukee, WI.
For primary bibliographic entry see Field 5B.
W78-00100

DISSOLVED AIR FLOTATION OF POULTRY PROCESSING WASTE,
Maine Dept. of Environmental Protection, Augusta.
S. W. Reed, and F. E. Woodard.
Journal Water Pollution Control Federation, January 1976, Vol. 48, No. 1, p. 107-120. 13 fig, 18 ref, 4 tab.

Descriptors: *Food processing industry, *Flotation, *Suspended solids, *Hydrogen ion concentration, *Polyelectrolytes, *Waste water treatment, Poultry.
Identifiers: *Poultry processing wastes, *Dissolved air flotation, Dissolved organic carbon.

Optimum chemical doses and time of chemical addition are determined for suspended solids removal using dissolved air flotation of chilled water from a poultry processing plant. An optimum pH and aluminum sulfate dose exists, but no direct relationship is found between suspended solids concentration and the optimum aluminum sulfate dose. Optimum air:solids ration and rise rate of particles being floated are also investigated. (EPA, Corvallis)
W78-00101

REDUCING WASTE LOADS FROM POULTRY PROCESSING PLANTS,
Texas Agricultural Extension Service, College Station.
P. B. Mellor, and F. A. Gardner.
December 10, 1976. 4 p, 2 tab, 1 ref.

Descriptors: *Biochemical oxygen demand, *Cost comparisons, *Food processing industry, *Screens, Industrial wastes, Local governments, Municipal wastes, Sampling, Pretreatment(Water), *Waste water treatment, Texas.
Identifiers: *In-plant waste control, *Poultry processing wastes.

Since EPA regulations require municipalities to charge users for pollutant concentrations higher than those of normal households, most poultry plants in Texas are or will be interested in lowering organic concentrations in their wastewater. This report is directed to the area of in-plant control and alterations to decrease organics in a plant's wastewater. A study showed that effluent from the Neches River Conservation District demonstration poultry plant decreased in levels of BOD from 880 mg/l to 680 mg/l adn of TSS from 1050 mg/l to 270 mg/l when rotary screens for feathers and offal were moved from the post-pump position to the prior-to-pumping sumps below the floor level. The monthly municipal surcharge reduction rates due to this change are given for concentrations of BOD and TSS. Methods of dry handling and separate treatment of high organicly loaded wastewater in the plant are discussed. (Prodehl-EPA, Corvallis)
W78-00103

SCREW PRESS DEWATERING SOLVES COSTLY WASTE DISPOSAL PROBLEM,
Cross Bros. Meat Packers, Inc., Philadelphia, PA.
R. Fitzgerald, and K. J. Kovacs.
National Provisioner, Vol 175, No 20, p 12 - 14, November 13, 1976.

Descriptors: *Waste water treatment, *Food processing industry, *Dewatering, *Heat treatment, *Hydraulic design, Livestock, Biochemical oxygen demand, Treatment, Costs, Design, Effects, Disposal.
Identifiers: *Meat packing wastes, *Paunch manure disposal, *Dessication, Slaughterhouse.

A paunch manure waste handling and disposal problem was eliminated by means of a dewatering process utilizing a screw press. Cross Brothers Meat Packers, Inc. slaughters from 550 to 600 cattle per day, each animal containing 40 to 50 lbs. of paunch manure containing 82% water and extremely high BOD. Landfilling disposal, treatment with the plant's primary clarifier, and dewatering by cooking were found unacceptable. The satisfactory existing treatment and disposal process for the paunch manure consists of (1) a partially dewatering vibrating screen (moisture reduced to 70%) (2) conveyor to a perforated walled hopper, (3) the dissicator screw press (moisture reduced to 40 - 45%), and (4) a batch cooker where blood is also added (moisture reduced to 8%). Research is being done on the possibility of using the remaining by-product as an animal feed. Since the use of this dewatering system, municipal waste disposal surcharge costs have been reduced by several thousand dollars per quarter. (Prodehl - EPA, Corvallis).
W78-00105

COMPOSTING PAUNCH MANURE,
King and Co. Indianapolis, IN.
For primary bibliographic entry see Field 5E.
W78-00106

THE MEAT PACKING PLANT WASTE DISPOSAL PROBLEM,
Michigan Engineering Experiment Station, East Lansing.
E. F. Eldridge.
Bulletin 105, December 1946. 50 p., 16 fig, 4 tab, 21 ref.

Descriptors: *Industrial wastes, *Food processing industry, *Waste water treatment, *Treatment facilities, *Activated sludge, *Flotation, Anaerobic digestion, Biological treatment, Water pollution treatment, Biochemical oxygen demand, Oil wastes, Pretreatment(Water), Screens, Sedimentation, Septic tanks, Waste identification, Design criteria, Chlorination.
Identifiers: *Meat packing wastes, Grease recovery, Primary treatment, Secondary treatment, In-plant waste control.

General methods of waste disposal for meat packing plants (including slaughter-houses) are discussed for both the small and large plant. The chief organic matter dealt with include blood, manure, hair, dirt and grease washed from the floor and equipment. Standards for emitting effluent to streams and to a city treatment plant are discussed. Advice on procedure of selecting a treatment method is given and categorized into 3 groups: those (1) containing salable materials, (2) which can be discharged directly, and (3) which must be treated. Two treatment processes are advised and discussed for the small plant: biological filtration and superchlorination preceded by elementary primary treatment, and effective grease removal. Methods of primary and secondary treatment for large plants are discussed; some design criteria for the different units and processes are included. (Prodehl EPA, Corvallis)
W78-00107

WASTEWATERS DISCHARGED FROM AN ABATTOIR,
Water Pollution Research Lab., Stevenage (England).
For primary bibliographic entry see Field 5B.
W78-00108

DESIGN OF A GREASE RECOVERY PLANT FOR A MEAT PACKER,
Arizona Univ., Tucson.
A. H. Beard Jr.

In: Proceedings of the Fourth Industrial Waste Conference, Layfayette, Indiana, Engineering Extension Series No 68, p 129, Sept 21-22, 1948.

Descriptors: *Flotation, *Oil wastes, *Sedimentation, Waste identification, Design data, Food processing industry, *Treatment facilities, *Waste water treatment, Biochemical oxygen demand, Suspended solids.
Identifiers: *Meat packing wastes, Grease recovery, In-plant waste control.

The harmful effect of grease on receiving water courses and sewage-treatment plants has been an incentive to bring about maximum grease recovery from liquid wastes. Several variable factors which are inherent in the packing plant waste discharge are discussed and statistics on the published data from the United States Health Service and other sources on the combined waste volume from 16 different packing plants are given. The degree of varience of composition of wastes from different packing plants is also shown by tabulated average values of ibs. BOD, lbs, suspended solids, and lbs. of grease per 1,000 lbs. of animals killed from three different sources. Statistics are also given on amounts and origin of raw and processed fat from a typical large packing plant. Methods of preliminary and actual design for grease reclamation using flotation and sedimentation processes are discussed. The principal factors necessary for a thorough survey are listed. A detailed design example of a grease recovery plant for a typical mixed kill packing plant using a two-stage recovery system is given, including initial and operating costs. (Prodehl - EPA, Corvallis)
W78-00109

TREATMENT OF MEAT PACKING WASTES,
Sioux Falls Municipal Treatment Plant, SD.
L. Bradney, W. Nelson, and R. E. Bragstad.
Sewage and Industrial Wastes, Vol 22, No. 6, p. 807 - 816, June 1950, 6 figs, 4 tab, 9 ref.

Descriptors: *Trickling filters, *Sludge digestion, *Nitrogen, Design data, Activated sludge, Biochemical oxygen demand, Flow rates, Industrial wastes, Food processing industry, Oil wastes, Waste identification, *Waste water treatment.
Identifiers: *Meat packing wastes, *Grease, In-plant waste control.

Methods of treatment for meat packing wastes are discussed with reference to waste discharge data collected from the John Morrel and Co. meat packing plant is Sioux Falls, South Dakota. Of the losses sustained by the packing houses, those of grease and organic nitrogen appear to be the most objectionable if these wastes are discharged to sewers for further treatment by a sewage treatment plant. The excessive effects and standard methods of plant control of each are discussed. Methods used and problems confronted in pretreatment, primary settling, secondary treatment, and digestion by the city's treatment plant are reported. Because of excessive loads on the secondary treatment (using both activated sludge and trickling filters) performance was improved for the standard filter by (1) installing primary filters of the backwash type ahead of the standard filters, (2) replacing dosing siphons and fixed nozzles with rotary distriubtors, and (3) recirculating at a rate of 5.0 m.g.d. The rising of sludge in the final sedimentation tanks was a problem at this plant. Methods used to combat this problem are described. (Prodehl - EPA, Corvallis)
W78-00110

THE CHARACTERISTICS OF WASTES FROM CHICKEN PACKING PLANTS,
Rutgers - The State Univ., New Brunswick, NJ.
For primary bibliographic entry see Field 5B.
W78-00111

WASTES FROM POULTRY DRESSING ESTABLISHMENTS,
Public Health Service, Kansas City, MO.
For primary bibliographic entry see Field 5B.
W78-00112

THE DESIGN AND OPERATIONS OF A WASTE TREATMENT PLANT FOR A SMALL PACKING PLANT,
Burns and McDonnell, Kansas City, MO.
A. H. Wymore.
In: Proceedings of the 6th Industrial Waste Conference, Purdue University, Lafayette, Indiana, Engineering Extension, Series No. 76, p. 413-421, February 1951, 2 fig, 2 tab.

Descriptors: *Waste water treatment, *Food processing industry, Trickling filters, *Sedimentation, *Flotation, *Oil pollution, Biochemical oxygen demand, Industrial wastes, Nitrates, Nitrites, Water analysis, Treatment facilities, Design data, Digestion, Heat, Costs, Missouri.
Identifiers: *Meat packing wastes, *Grease pollution, *Slaughterhouses.

A new treatment plant was placed in operation by the Reitz Meat Products Company in June, 1948 to replace a system of small septic tanks. The wastes include those typical of a plant doing both slaughtering and meat processing. A high degree of conservation in the plant is practiced; an exception being loss of grease which is troublesome in the trickling filter. The waste discharge cycles around an eight-hour working day. The sewage treatment plant is designed for 2:1 recirculation in each of the two stages of filtration, and the primary and secondary clarifiers and trickling filter are of combined 'Duo' - unit types. The digester is part of the clarifier in a chlorigester design where heated water is added from the main plant boilers. Conventional sludge drying beds are provided. Complete design data are given along with methods of plant operations. Analyses of sampled effluent including S.S., BOD., COD, total organic nitrogen, nitrates, and nitrites are tabulated. Problems still existing are water coloration by red dye and obstruction of equipment by grease, otherwise the effluent appears to be satisfactory. Cost of the sewage plant was about $50,000. (Prodehl - EPA, Corvallis)
W78-00113

TWO INDUSTRIAL WASTE PROBLEMS AT NEW HAVEN, CONN.,
Hartford Sewage Treatment Plant, CT.
For primary bibliographic entry see Field 5A.
W78-00114

POULTRY DRESSING WASTE,
Indiana State Board of Health Indianapolis.
P. E. Miller.
In: Proceedings of the 6th Industrial Waste Conference, February 21 - 23, 1951, Purdue University, Layfayette, Indiana, Engineering Extension Series No. 76, p. 176-180, 6 fig, 1 ref.

Descriptors: *Waste identification, *Food processing industry, *Septic tanks, *Lagoons, Biochemical oxygen demand, Water analysis, Pollutant identification, Waste water treatment, Treatment facilities.
Identifiers: *Poultry processing wastes, Slaughterhouse wastes.

A plant designed to dress about 5,000 chickens per day has liquid wastes from poultry dressings containing varying amounts of blood, feathers, fleshings, washings from evisceration, digested and undigested food, manure, and dirt. All wastes go to floor draines, through sewers to two parallel 225 gallon screen pits provided with 1/4 inch mesh vertical screens, to a 14,430 gallon septic tank, and onto a 300,000 gallon lagoon draining by seepage into an underlying gravel stratum. Ammonium nitrate on the water surface has been used to control odors. A single day's analysis of a 9-hour composite sample is reported and shows a 5-day BOD of 385 ppm, SS 248 ppm, VSS 232 ppm, total solids 993 ppm, volatile total solids 447 ppm, pH 7.3, and average waste flow 49 gpm. Reduction in BOD is given for the septic tank and lagooning processes. Load factors per 1,000 lb. live weight and population equivalents are given. (Prodehl - EPA, Corvallis)
W78-00115

WASTE HANDLING AND DISPOSAL GUIDELINES FOR INDIANA DAIRYMEN.
Purdue Univ., Lafayette, IN. Animal Waste Committee.
For primary bibliographic entry see Field 5E.
W78-00119

WASTEWATER RESEARCH EXPANDS,
For primary bibliographic entry see Field 5E.
W78-00122

MEAT PACKINGHOUSE WASTEWATER: CHARACTERIZATION BY SOURCE,
Texas Univ. at El Paso. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W78-00166

CHEMICAL TREATMENT OF MEATPACKING PLANT WASTEWATER FROM UNIT OPERATIONS,
Texas Univ. at El Paso. Dept. of Civil Engineering.
C. O. Payan.
Master Thesis, May 1975. 79 p, 7 fig, 39 tab, 23 ref.

Descriptors: *Chemical precipitation, *Coagulation, *Flocculation, *Food processing industry, Water analysis, Chemical reactions, Chlorides, Data collections, Suspended solids, Nitrogen, Water sampling, Texas, *Waste water treatment.
Identifiers: *Meatpacking wastes, *Ferric chloride, *Polyelectrolytes, Blood, Manure, Offal, Carbon removal, Nitrogen removal, Aluminum sulfate.

Since it is of significant economic advantage to reclaim blood and other scraps, the use of chemicals to treat these products has been introduced. The purpose of this study is to investigate and determine the optimum chemical dosage for treatment of the various wastes produced in the meatpacking process. A literature review on current methods and uses of chemical coagulation and precipitation using lime, aluminum sulfate, sodium silicate, ferrous and ferric salts, chlorine and organic polymers is presented. The chemical reactions involved in chemical treatment are presented. Results of studies and field investigations using polymers in combination with alum or ferric chloride are discussed. A study was conducted on chemical treatment of blood, manure, and stomach washing wastes from the Peyton Meatpacking Company, El Paso, Texas. The chemicals were ferric chloride and sodium carbonate buffer, and a polymer (Nalco 676). The results of tests conducted, varying the concentration of the chemicals and order of addition, are tabulated indicating the various natures of flocculation and amount of kjeldahl nitrogen and total solids reduction. Conclusions include: (1) carbon removal increases with increase in ferric chloride dosage, and (2) the addition of a polymer (Nalco 676) greatly enhances the precipitation process for all wastes tested. (Prodehl-EPA, Corvallis)
W78-00167

STATISTICAL EVALUATION OF PACKINGHOUSE WASTE DATA,
Environmental Health Center, Oak Ridge, TN.
For primary bibliographic entry see Field 5A.
W78-00169

NEW DEVELOPMENTS IN PACKINGHOUSE WASTE TREATMENT,
Minnesota Univ., Minneapolis. Dept. of Sanitary Engineering.
G. J. Schroepfer.
In: Proceedings of the 8th Industrial Waste Conference, Purdue University, Lafayette, Indiana, Engr. Ext. Ser. No. 83, May 1953, p. 518-539, 9 fig, 11 tab.

Descriptors: *Anaerobic digestion, *Biological treatment, *Food processing industry, Biochemical oxygen demand, Cost analysis, *Waste water treatment, Data collections, Industrial wastes.
Identifiers: *Meat packing wastes, Anaerobic contact process.

Described are recent developments in a new method of treating packinghouse wastes involving anaerobic decomposition instead of the conventional aerobic processes. In March, 1952, the Committee on Meat Packing Plant Waste Disposal of the American Meat Institute requested evaluation of data on a pilot plant anaerobic process in Austin, Minnesota. The paper resulting from the analysis is made up of three general parts: (1) a discussion of the preliminary tests with a evaluation of results; (2) a summary of certain special investigations preparatory to the actual research tests; (3) the presentation of data on the research test program presently underway. Results of the data on the anaerobic contact process over a three-year period include: (1) removal of at least 95 percent of the BOD and suspended solids accomplished at loadings as high as .20 lbs. BOD per cu. ft. of digestion tank per day, with 13-hour detention periods on raw waste flow; (2) tow explanations for the large loadings are high process temperatures and high solids concentration in this system. (Prodehl - EPA, Corvallis)
W78-00170

ALTERNATIVES TO END-OF-PIPE TREATMENT,
CH2M/Hill, Corvallis, OR.
R. E. Pailthorp.
Civil Engineering - ASCE, February 1977, p. 49 - 52, 2 fig.

Descriptors: *Regulation, *Recycling, *Water reuse, *Food processing industry, *Recycling, *Federal water pollution control act, Waste treatment, *Waste water treatment, Grants, Pollution abatement, Cost analysis, Economic feasibility.
Identifiers: *Meat packing wastes, Food processing wastes, Protein recovery.

End-of-pipe treatment must be replaced by innovative, in-process changes if industrial plants are to creatively meet the upcoming 1983 EPA pollution control requirements. By-products recovery, production, and utilization are alternatives needing research, development, and financial backing. Discussed are: (1) existing and potential systems for by-product recovery, (2) the concept of an industrial complex created totally for complete waste product utilization and by-product production, and (3) a practical approach to optimizing end-of-pipe treatment versus in-process changes. Examples of by-product utilization are protein recovery, solids recovery for cattle feed, and waste-product conversion to secondary products. (Prodehl -EPA, Corvallis)
W78-00172

LEATHER TANNERY WASTE MANAGEMENT THROUGH PROCESS CHANGE, REUSE AND PRETREATMENT,
Pfister and Vogel Tanning Co., Milwaukee, WI.
J. M. Constantin, and G. B. Stockman.
Environmental Protection Agency, Report No. 600/2-77-034, January 1977, 172 p.

Descriptors: *Tannery wastes, *Chromium, *Sulfides, *Oil wastes, Waste identification, Chemical reactions, Design data, Waste water treatment.
Identifiers: *Leather industry, Chromium recycle, Sulfide reduction, Oil and grease separation, Waste characterization and loading.

Reduction of tannery waste, i.e., trivalent chromium, sulfide and oil and grease components has been accomplished by process change. Protein recovery and hydroclonic separation of solids was possible in tannery processing in reducing waste loading. All waste load reduction was accomplished without loss of leather quality. Waste characterization through material balance was accomplished. Chemical reactions and engineering design factors provide guidance for other plant scale operation. (EPA-Corvallis)
W78-00173

THE ANAEROBIC CONTACT PROCESS AS APPLIED TO PACKINGHOUSE WASTES,
Minnesota Univ., Minneapolis. Dept. of Sanitary Engineering.
G. J. Schroepfer, W. J. Fullen, A. S. Johnson, N. R. Ziemke, and J. J. Anderson.
Sewage and Industrial Wastes, Vol. 27, No. 4, April, 1955, p. 460-487, 6 tab, 15 fig, (presented at 27th Annual Meeting, Federation of Sewage and Industrial Waste Assns.; Cincinnati, Ohio; Oct 11-14, 1954).

Descriptors: *Anaerobic digestion, *Laboratory tests, *Food processing industry, *Waste water treatment, Analysis, Biochemical oxygen demand, Additives, Costs, Sedimentation, Trickling filter, Sampling.
Identifiers: *Meat packing wastes, Evacuation tank.

Pilot plant investigation of the anaerobic treatment of packing plant wastes was underway at the Geo. Hormel and Co. plant at Austin, Minnesota for a 4-year period from 1950 to 1954. A program of analysis and research tests were promoted by the American Meat Institute from 1952 to 1954, and description and results of these tests are presented. The pilot plant is described. The four periods of investigations from which data are reported are: (1) early tests from July 1950 to September 1952, during which separation was generally unsatisfactory. (2) Preliminary tests from October to December 1952, where a new separation process employed evacuation followed by gravity settling. (3) The 1953 research test program in which fly ash was employed. (4) The 1953-54 research test program conducted without benefit of additives to determine the effects of: (a) loading and detention of efficiency, (b) the degree of vacuum on processing efficiency and costs, (c) digestion temperatures, and (d) degree of mixing on efficiency. A process was developed which is capable of accomplishing removals in 5-day BOD of 95% and SS of 90% at loadings up to 0.20 lb. of BOD per cubic foot of digester volume per day. (Prodehl - EPA, Corvallis)
W78-00175

DIRECT COMPARISON IN PHYSIOCHEMICAL TREATMENT OF PACKINGHOUSE WASTEWATER BETWEEN DISSOLVED AIR AND ELECTROFLOTATION,
Swift and Co., Oak Brook, IL. Research and Development Center.
E. R. Ramirez, D. L. Johnson, and O. A. Clemens.
Presented at 31st Annual Purdue Industrial Waste Conference, May 4-6, 1976, West Lafayette, Indiana. 29 p, 4 fig, 10 ref.

Descriptors: *Air entrainment, *Flotation, *Food processing industry, Basins, Coagulation, Electrical equipment, Industrial wastes, Oil wastes, Pretreatment(Water), Suspended solids, *Waste water treatment, Water analysis.
Identifiers: *Meat packing wastes, *Rendering wastes, *Dissolved air flotation, *Electro flotation, Primary treatment, Electrocoagulation-electroflotation.

Wastewater generated (.9 - 1.5 MGD) at the Swift Company beef slaughterhouse plant in Grand Island, Nebraska, was divided into two parallel treatment basins using a split water mechanism to feed each basin. Evaluation and comparisons of dissolved air flotation vs (1) electroflotation and (2) electrocoagulation with electroflotation processes on wastewater were performed. The evaluation program was further divided into Phase I, including evaluating wastewater treatment without the dehairing operation; and Phase II, with the dehairing operation. Effluent composite samples were taken on a continuous basis. Conclusions include (1) little difference was found between the performance of dissolved air flotation (20% recycle) and electroflotation in conjunction with metal coagulants in primary treatment of Phase I wastewater (2) neither dissolved air flotation nor electroflotation alone is a satisfactory primary treatment for Phase II wastewaters; electrocoagulation-electroflotation primary treatment is needed for satisfactory effluent to municipal treatment plants (3) electrolytic processes are especially effective in removing ammonia-nitrogen values from wastewater. (Prodehl - EPA, Corvallis)
W78-00177

THE PURIFICATION OF THE EFFLUENT WATER IN THE MEAT AND FISH INDUSTRY,
Provincial Chemical Lab. of Cremona (Italy).
P. Baldacci, A. Canuti, and G. Coppiardi.
Report TR-467-74, (1974), 21 p. Translation from Industrie Alimentari, Vol. II, No. 2, p 51-58, 1972. 28 ref.

Descriptors: *Data collections, *Food processing industry, *Patents, *Waste water treatment, Activated sludge, Aerobic treatment, Anaerobic digestion, Analysis, Biochemical oxygen demand, Organic wastes.
Identifiers: *Meat packing wastes, *Poultry processing wastes.

The studies of twenty-eight authors are briefly presented on the problems of pollution caused by the meat and fish industry and methods of control. Methods of treatment, recovery and utilization of effluents, and patents on specific processes are discussed. The activated sludge treatment is generally employed to purify this type of effluent; particularly in high density areas, with respect to both people and animals. (Prodehl - EPA, Corvallis)
W78-00178

ECONOMIC ANALYSIS OF SPRAY IRRIGATION OF POULTRY PROCESSING WASTEWATER VS. UPGRADING OF WASTEWATER TREATMENT FACILITIES,
Mogul Corp., Chagrin Falls, OH.
R. L. Cooper.
Presented at the Seventh Engineering Foundation Conference, February 14, 1977. 24 p. 3 fig, 4 tab.

Descriptors: *Aerated lagoons, *Economic feasibility, *Waste water treatment, *Waste disposal, Biochemical oxygen demand, Flotation, Food processing industry, Sprinkler irrigation, Filtration, Land use, Nitrogen oil wastes, Ponds, Cost comparisons.
Identifiers: *Poultry processing wastes, Discharge requirements, Waste loads, Chemical addition.

A poultry processing plant needs to improve its waste treatment system to meet North Carolina discharge limitations. The maximum day limitation was equivalent to BOD5, TSS, TKN and Oil and Grease of 16.5, 18.3, 4.6 and 12.8 mg/l, respectively. The plant processed 38,500 chickens daily and had an average discharge of 0.15 mgd. Two methods of upgrading the treatment system were economically evaluated. The present system included a rotary screen, a grease trap with skimmer, an aerated lagoon and a stabilization lagoon. The first alternate for upgrading was in air

flotation, with chemical addition prior to the aerated lagoon, clarifier following the aerated lagoon and a sand filter and chlorination following the stabilization lagoon. The second alternate included the air flotation system and a spray irrigation percolation system following the stabilization lagoon. Each of the systems was considered capable of satisfying the effluent limitations. The first alternate would have had a lower capital investment but cost over 25% more than spray irrigation over a 10-year period. (Witherow - EPA, Corvallis)
W78-00179

POULTRY PROCESSOR MEETS CHALLENGE OF INCREASED WASTE LOAD,
Gold Kist, Inc., Atlanta, GA.
For primary bibliographic entry see Field 5A.
W78-00180

ANAEROBIC DIGESTION OF PACKING PLANT WASTES,
Hormel (George A.) and Co., Austin, MN.
W. J. Fullen.
Sewage and Industrial Wastes, Vol 25, No 5, p 576 - 585, May 1953. 4 fig, 9 tab.

Descriptors: *Sedimentation, *Anaerobic digestion, *Waste water treatment, Biochemical oxygen demand, Food processing industry, Nitrogen, Water analysis.
Identifiers: *Meat packing wastes, Clarification.

Laboratory investigation of anaerobic treatment for packinghouse wastes was performed by George A. Hiormel and Co. Pilot plant study was started July, 1950. The pilot plant consist of the holding tank, digester, degassing chamber, and rectangular clarifier. Operational changes are discussed for successive time periods. Samples of the raw feed and final effluent, analyzed daily by 'standard methods', are tabulated for the successive time periods, along with the pilot plant loadings and efficiencies. Returned sludge from the clarifier to digester amounts to 60% of the total influent flow, and suspended solids 1.6%. The cost of vacuum for the degassing chamber calculated at 160,000 KW/hr. annually $0.01 per KW/hr is $1,600. Vacuum treatment allows sludge to settle rapidly and remain down for 1 to 3 hours. Savings of 35 to 50% in construction costs and 15 to 25% in 1 to 3 hours. Savings of 35 to 50% in construction costs and 15 to 25% in operation have been predicted, as compared with the aerobic method of sedimentation and filtration with comparable BOD removals (Prodehl EPA, Corvallis).
W78-00181

OPERATING AND ECONOMIC FACTORS INVOLVED IN THE STUDY OF A PACKING WASTE PROBLEM,
Illinois Univ. at Urbana-Champaign. Dept. of Bacteriology.
H. O. Halvorson.
Sewage and Industrial Wastes, Vol 25, No 2, p. 170-176, February, 1953. 5 fig, 1 ref.

Descriptors: *Biochemical oxygen demand, *Cost analysis, *Waste identification, Industrial wastes, Food processing industry, *Waste water treatment, Water analysis, Iowa.
Identifiers: *Meat packing wastes, In-plant waste control, Water use.

A waste treatment study involving most efficient operating plant processes and economic was made at the Morrell Packing Plant at Ottumwa, Iowa. The plant slaughters hogs, cattle, and sheep with a plant capacity of about 2,000,000 lbs. of live animal slaughtered per day. The first step in these studies was to provide facilities for continuous measurement of flow and the collection of daily samples of effluent waste. A frequency distribution was made of pounds BOD per 1,000 lbs. live weight. By making some broad generalizations, it was possible to calculate the cost of waste treatment per million gallons of water vs strength of waste. A cost nomograph was constructed in which net costs of evaporation of waste waters were included as a proportion of the waste strength. From such cost analysis this plant decided that any waste having a BOD in excess of 14,000 ppm should be sent to the evaporators; wastes weaker than that should be treated as sewage. (Prodehl - EPA, Corvallis)
W78-00182

STERLING POULTRY PIONEERS PLANT WATER RECLAMATION,
Sterling Poultry Processing Corp., Oakland, MD.
D. Timmons.
Broiler Business, Vol 27, No 5, May 1976, p. 22 - 30, 9 photos, 1 schematic.

Descriptors: *Food processing industry, *Oxidation lagoons, *Recycling, *Waste water treatment, *Water analysis, Grants, Poultry, Standards, Sampling.
Identifiers: *Poultry processing wastes, In-plant waste control.

Methods used by Sterling Poultry Processing Corp. to treat their plant sewage to meet state requirements are initially discussed. Methods of in-plant water recycling and reuse are discussed. The corporation was given a grant from the EPA and the Maryland State Health Agency to do waste water recycling experimental work. University students collect samples from the regular fresh chilling process water and from a chiller using 100 percent recycled waste water, and perform complete chemical and microbiological analysis. The sampling technique is described. Problems encountered and methods of redesign caused by increasing Federal water standards are discussed. A detailed schematic of the plants waste water treatment system incorporated with its reclaming facilities is shown, including points and connections for the water sampling studies. (Prodehl - EPA, Corvallis)
W78-00183

OUTLINE OF TANNING WASTE TREATMENT STRATEGY IN JAPAN,
Public Works Research Inst., Tokyo (Japan).
T. Annaka, and K. Sakai.
September, 1976. 28 p, 27 fig, 9 tab, 4 ref.

Descriptors: *Tannery wastes, *Activated sludge, *Chemical precipitation, *Sedimentation, *Standards, State governments, Trickling filters, *Waste water treatment, Aerated lagoons.
Identifiers: Joint pretreatment facilities, *Japan.

The effluent standards for tanning waste in Japan are presented and discussed. Included is the national effluent standard under the Water Pollution Control Act (1971), the temporary effluent standard for tannery waste for transitional period 1971 - 1981, and the District effluent standards for tannery wastes. The tanning waste treatment program in one district is presented and explained. The methods outlined for this program are: (1) a 20% solids removal sedimentation tank in each factory, (2) effluents from each sedimentation tank collected in nine joint pretreatment facilities, where 70% suspended solids removal occurs by chemical clarification or plain sedimentation, (3) effluent from joint facilities accepted by public sewers and treated with domestic sewage by activated sludge process. Procedures and results of some experimental methods used to improve the tannery waste treatment for this program are illustrated, the wastes being chromium and vegetable tanning wastes, and domestic sewage, combined. Included in these studies are: (1) pre-mixing to improve settleability in the sedimentation processes, (2) addition of sulfuric acid as a coagulant in chemical clarification, and (3) biological treatment by (a) activated sludge process (using air and pure oxygen), (b) trickling filter process, and (c) aerated lagoon process. (Prodehl-EPA, Corvallis)
W78-00184

TOTAL SYMBIOTIC POLLUTIONLESS SYSTEMS FOR EFFICIENCY MANAGING WATER, EFFLUENTS, SOLID ORGANIC WASTES, AND ODORS IN FOOD PROCESSING AND SIMILAR INDUSTRIES,
Manitoba Univ., Winnipeg. Dept. of Food Science.
R. A. Gallop, A. W. Hydamaka, P. W. Stephen, and R. K. Rastogi.
Paper presented at AI Ch E - EPA, Third National Conference on Complete Watereuse, Cincinnati, June 27 - 30, 1976. 27 p, 9 fig, 20 ref.

Descriptors: *Food processing industry, *Recycling, *Water reuse, Activated carbon, Cost analysis, Design criteria, Industrial wastes, Planning, Poultry, Canneries, *Waste water treatment, Odor, Organic wastes.
Identifiers: *Poultry processing wastes, Total systems design, Symbiotic design.

The goals and objectives of the research, development and demonstration program begun by EPA and the Food Processing Industry are surveyed. The Total Systems Approach is described as the means of meeting the legislative goal of zero discharge. Process change, by-product recovery, water recycling, and treatment are part of the total systems approach. The Total Systems Approach is discussed in general terms with several specific examples. The technical and economic advantages of this approach are enumerated. (Witherow-EPA, Corvallis)
W78-00185

CHICK HATCHERY WASTES DISPOSAL,
Buchart-Horn, Lewisburg, PA.
For primary bibliographic entry see Field 5E.
W78-00186

SLUDGE HANDLING AND DISPOSAL: A SPECIAL REPORT,
Nalco Chemical Co., Oak Brook, IL.
For primary bibliographic entry see Field 5E.
W78-00187

PROCEEDINGS: LAKE TAHOE RESEARCH SEMINAR III.
Lake Tahoe Area Research Coordination Board, South Lake Tahoe, CA.
For primary bibliographic entry see Field 5G.
W78-00260

AREAWIDE WASTE TREATMENT AND EROSION CONTROL PLANNING,
For primary bibliographic entry see Field 5G.
W78-00265

TREATMENT OF AQUEOUS WASTE,
Pullman Inc., Chicago, IL. (Assignee).
J. E. Wallace.
U.S. Patent No. 4,026,791, 6 p, 2 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 958, No 5, p 2118, May 31, 1977.

Descriptors: *Patents, *Waste water treatment, *Water pollution treatment, *Water quality control, Industrial wastes, *Chemical wastes, *Phenols, Aromatic compounds, Separation techniques, Solvent extraction.

In the process of producing phenol from cumene, aqueous waste streas result which are contaminated with organic materials, particularly phenol, which are made innocuous to the environment only with substantial difficulty. A process is described to reduce the biological oxygen demand of these aqueous wastes, particularly the phenol content, by a liquid extraction step whereby a highly aromatic fraction of a organic waste stream in the phenol process is used as the solvent. The process includes provision for simultaneous preparation and recovery of the solvent as well as recovery of the phenol. (Sinha - OEIS)

W78-00270

FILTER SYSTEM AND METHOD OF FILTERING ANIMAL PROCESSING WASTES,
Kalbfleisch (Herbert L.), Sooke (British Columbia). (Assignee).
G. O. Orth, Jr.
U.S. Patent No. 4,026,792, 4 p, 2 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 958, No 5, p 2118, May 31, 1977.

Descriptors: *Patents, *Waste water treatment, *Oily wastes, *Oil pollution, Industrial wastes, Food processing industry, Filtration, Fibrous beds, Cellulose, Separation techniques.
Identifiers: Hydrophobic fiber filters, Hydrophilic fiber filters.

Alternate hydrophilic and hydrophobic fiber filters are used to remove particulate matter and oil from aqueous animal processing wastes, such as those from cannery operations, poultry processing plants and packing plants. The fiber used to make the filters is preferably a low-lignin content, cellulosic fiber that is digestible by ruminating animals. The adsorbed oil in the hydrophobic filter may be removed and the filter reused. The hydrophilic fiber filter containing particulate matter may be dewatered and converted to animal feed or fertilizer. (Sinha - OEIS)
W78-00271

PROCESS FOR RESOLVING OIL-IN-WATER EMULSIONS BY THE USE OF A CATIONIC POLYMER AND THE WATER SOLUBLE SALT OF AN AMPHOTERIC METAL,
Nalco Chemical Co., Oak Brook, IL. (Assignee).
F. A. Mauceri.
U.S. Patent No 4,026,794, 5 p, 1 tab, 4 ref; Official Gazette of the United States Patent Office, Vol 958, no 5, p 2119, May 31, 1977.

Descriptors: *Patents, *Oil pollution, *Oily wastes, *Waste water treatment, *Water pollution treatment, Industrial wastes, Emulsions, Separation techniques, Flocculation, Neutralization, Polymers.
Identifiers: Metal working industry.

An object of this invention is to provide a method for the resolution of oil-in-water emulsions and the recovery of oil from industrial plant effluents. The method is by treating the oily waste water with a composition comprising: a water soluble salt of an amphoteric metal; a water soluble cationic terpolymer, the terpolymer containing prior to polymerization: diallyl dimethyl ammonium chloride, N-vinyl-2-pyrrolidone, and acrylamide, the terpolymer having a molecular weight range of from 5,000 to 300,000; and water. When this composition is added to the oily waste water the negatively charged water particles will neutralize and from an easily recoverable floc containing the oil. (Sinha-OEIS)
W78-00273

PROCESS FOR THE PURIFICATION OF INDUSTRIAL EFFLUENTS,
Ciba-Geigy Corp., Ardsley, NY. (Assignee).
H. Wegmuller, and J. Haase.
U.S. Patent No 4,026,796, 9 p, 11 ref; Official Gazette of the United States Patent Office, Vol 958, no 5, p 2119, May 31, 1977.

Descriptors: *Patents, *Waste water treatment, *Water purification, *Water pollution treatment, *Industrial wastes, Color, Absorption, Cellulose, Pulp and paper industry, Tannery wastes, Bleaching wastes, Dyes, Separation techniques.
Identifiers: Decolorization.

A complete or at least very extensive purification, including decolorization, of industrial effluents can be achieved if these are brought into contact with absorbents which consist of cellulose pretreated with precipitants. The process is suitable for the removal of anionic dyestuffs, optical brighteners, dyeing auxiliaries and washing agents, and for the elimination of residues of tanning agent. The cellulose to be used as the carrier material in the purification consists of bleached or unbleached spruce sulphite cellulose, Kraft cellulose or waste sheets from printing. Suitable precipitants are compounds which are adsorptively bound by the cellulose and which at the same time exert a precipitating or retaining action on the residual substances. In this respect, water-soluble basic aminoplasts such as formaldehyde-dicyanidiamide condensation products have proved suitable. (Sinha-OEIS)
W78-00274

BUFFERING AGENTS,
Aerojet-General Corp., El Monte, CA. (Assignee).
For primary bibliographic entry see Field 3A.
W78-00281

FROTH FLOTATION WITH SEWAGE TREATMENT PLANT WATER EFFLUENT,
Inspiration Consolidated Copper Co., Morristown, NJ. (Assignee).
G. F. Fountain, J. Veloz, E. A. Bilson, and J. A. Cronin.
U.S. Patent No. 4,028,235, 4 p, 2 tab, 4 ref; Official Gazette of the United States Patent Office, Vol 959, no 1, p 301, June 7, 1977.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, *Water pollution treatment, *Froth flotation, Mining, Water reuse, Water utilization.
Identifiers: Polyglycerols.

This invention provides a conditioned sewage treatment plant water effluent which can comprise up to 100% of the aqueous phase of an ore flotation pulp without having any adverse effects on the flotation. The method comprises using sewage treatment plant water effluent condition prior to use with at least about 3 parts per million of a polyglycerol. Such effluent is used in the froth flotation of copper sulfide ores. (Sinha-OEIS)
W78-00282

RECOVERY OF MERCURY,
Ontario Research Foundation, Sheridan Park. (Assignee).
D. W. Townsend, and H. D. Woods.
U.S. Patent No. 4,028,236, 3 p, 2 tab, 4 ref; Official Gazette of the United States Patent Office, Vol 959, no 1, p 301, June 7, 1977.

Descriptors: *Patents, *Waste water treatment, Industrial wastes, *Water pollution treatment, Water quality control, *Mercury, Iron, Reduction(Chemical).
Identifiers: Tin, Metal recovery, Chlorine producing plant.

With this invention the concentration of mercury in metallic and soluble ionic form in aqueous media, from various sources such as the liquid effluent from a sodium hydroxide-and chlorine-producing plant in which flowing mercury cathods are used in the electrolysis of sodium chloride solutions, may be decreased and in many cases substantially eliminated. The aqueous medium containing the mercury is contacted with tin-coated iron having exposed tin-iron interfaces in contact with the medium. The metallic mercury 'wets' the tin surface and is accumulated on it and the iron causes the mercury ions to be reduced to the metal which is then collected on the tin surface. The mercury may be recovered from the tin surface in any desired manner, typically by vacuum distillation. (Sinha-OEIS)
W78-00283

METHOD AND APPARATUS FOR TREATMENT OF FLUORINE-CONTAINING WASTE WATERS,
Hatachi Ltd., Tokyo (Japan). Assignee).
S. Nishimura, T. Sawa, K. Otani, and S. Kikkawa.
U.S. Patent No. 4,028,237, 9 p, 9 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 959, no. 1 p 301, June 7, 1977.

Descriptors: *Patents, *Waste water treatment, *Water pollution treatment, *Industrial wastes, *Chemical wastes, *Fluorines, Chemical reactions, Water pollution sources, Separation techniques.

The object of this invention is to provide a method for treating fluorine-containing waste waters and also waste water which contains not only fluorine but also phosphate. Aluminum ions added to fluorine-containing waste water to convert fluorine values to hardly soluble complexes, phosphoric acid or phosphate and calcium compound are added to form fluoride apatite with the residual fluorine in the waste water, and these complexes and apatite are removed from the waste water. Waste water containing phosphate in addition to fluorine in divided into concentrated waste water and dilute waste water according to the fluorine concentration, calcium compound is added to the concentrated waste water to form calcium fluoride, aluminum ions are added to the dilute waste water to convert fluorine values to hardly soluble complexes both the waste waters are mixed, calcium ions are added to the mixture to form fluoride apatite, and the so formed complex and apatite are removed from the mixed waste water. (Sinha-OEIS)
W78-00284

TREATMENT OF MUNICIPAL WASTE SLUDGES,
Dart Industries, Inc., Los Angeles, CA. (Assignee).
J. L. Allan.
U.S. Patent No. 4,028,238, 4 p, 1 tab, 8 ref; Official Gazette of the United States Patent Office, Vol 959, no 1, p 301-302, June 7, 1977.

Descriptors: *Patents, *Sewage treatment, *Sludge treatment, *Sludge disposal, Water pollution source, Chemical reactions, Flocculation, Neutralization, Waste treatment.
Identifiers: Sludge dewatering.

The municipal waste sludge of this invention is typically one that has been treated in a bio-lagoon and subsequently allowed to settle in a settling tank. However, it is within the scope of this invention to treat various other dilute waste sludges containing suspended material of high organic content and which would provide health hazards to the environment if disposed of without treatment. The sludge is made alkaline by the addition of a suitable alkali, e.g., lime. Alum (aluminum ammonium sulfate) is added to the alkalized sludge in conventional amounts and a gelatinous precipitate of aluminum hydroxide is formed. If needed, the pH of the sludge at this point is adjusted to a value of at least 9, preferably between 10 and 11. In order to agglomerate the suspended particles in the sludge, a flocculting agent is also added to the mixture. At this point the treated sludge will settle, and if desired, the supernatant clear liquid phase can be withdrawn and after neutralization to a pH in the range of about 6 to about 9 discharged without any pollution problems. (Sinha-OEIS)
W78-00285

METHOD OF THERMAL DISINFECTION OF SEWAGE AND PLANT REALIZING SAME,
V. A. Kokurin, I. A. Bakulov, and V. M. Kotlyarov.
U.S. Patent No. 4,028,242, 8 p, 2 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 959, no 1, p 302, June 7, 1977.

Descriptors: *Patents, *Sewage treatment, *Waste water treatment, *Water pollution treatment, *Disinfection, Water purification, Environmental sanitation, Thermal properties, Microorganisms, Sewage bacteria, Temperature.

Sewage is heated to a temperature above 100C in two steps. In the first step, sewage is heated to a temperature not greater than 100C and then conducted into the nozzle of a jet apparatus into which heat-carrier steam is also injected so that the sewage is heated to a temperature greater than 100C, which constitutes the second step of heating. The heated sewage is maintained in a continuous flow while being discharged from the jet apparatus, the pressure in the continuous flow corresponding to the steam saturation temperature. The invention can be employed for disinfecting sewage from pathogenic microorganisms and disease germs as well as for freeing sewage from harmful chemicals which on exposure to high temperatures decompose to form simple non-toxic substances. It may also find applicaton in veterinary and medical microbiology, in the production of biological preparations for agricultural and medical purposes, as well as in the processing of animal husbandry products. (Sinha-OEIS)
W78-00287

ARRANGEMENT FOR CONVERSION OF FOREIGN MATTER CONTAINED IN WATER,
Rheintechnik Weiland and Kaspar KG, Neunkirchen (West Germany). (Assignee).
T. Stahler.
U.S. Patent No. 4,028,245, 11 p, 9 fig, 13 ref; Official Gazette of the United States Patent Office, Vol 959, no 1, p 303-304, June 7, 1977.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, Water pollution treatment, *Water purification, Settling basins, *Biological treatment, *Aeration, Water reuse, Equipment.

A conversion tank is provided with an intake for the water to be treated and a drain for the treated water. There are hollow bodies which have several rotating perforations in the wall and are on one side completely emerged from the water and on the other side are completely immersed in the water. These bodies are pipes and are filled with matter which is insoluble in water and has a large surface accessible to air and water. The pipes are parallel to each other and parallel to the water surface. The rotating pipes on the emergent side carry along a large quantity of water which runs back to the conversion tank through the perforations during the travel of the pipes above the water level. At the same time they are enriched with air. A large part of this air is carried to the immersion side by the pipes underneath the water level where it is forced out of the pipes by the water. It rises in the water leading to further aeration of the water. Whenever the water which is aerated comes into contact with the biological breeding ground which forms on the material, it converts the harmful materials, particularly the fecal matter, into harmless matter. The water leaving the conversion tank after separating solid and floating matter can be used again. (Sinha-OEIS)
W78-00288

SEWAGE SETTLING TANK,
Sybron Corp., Rochester, NY. (Assignee).
R. F. McGivern.
U.S. Patent No. 4,028,249, 6 p, 3 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 959, no 1, p 305, June 7, 1977.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, Water pollution treatment, Settling basins, Sludge disposal, Settling velocity, Equipment, *Settling basins.
Identifiers: *Settling tanks.

The invention provides a multi-level tank which decreases the settling distance and therefore the settling time and which utilizes a floating siphon system that provides an efficient means for removing the settled materials from each tank layer. The settling tank contains vertically spaced decks which divide the tank into horizontal layers or settling zones. The decks are arranged so as to leave an unobstructed vertical channel extending substantially the full length of the settling tank. An inlet for liquid to be treated and an outlet for treated liquid communicates with each of the tank layers at opposite ends. A carriage floating on the liquid moves from one end of the tank to the other and siphons carried by the carriage have a depending leg extending down the vertical channel to one of the decks and a horizontal header extending across the deck for purposes of removing the sludge which has settled on to the deck. (Sinha-OEIS)
W78-00289

METHOD OF SEPARATING IONIZED SUBSTANCES FROM AN AQUEOUS SOLUTION,
Kernforschungsanlage Juelich G.m.b.H. (West Germany). (Assignee).
U. Zimmermann.
U.S. Patent No. 4,024,054, 8 p, 5 ref; Official Gazette of the United States Patent Office, Vol 958, No 3, p 1192, May 17, 1977.

Descriptors: *Patents, *Separation techniques, *Water pollution treatment, *Heavy metals, Water quality control, Osmosis, Transfer, Sea water, *Waste water treatment, Bubbles.

Ionized substances such as heavy metal ions are separated from a mixture dissolved in aqueous solution such as sea water, lake water, waste water and the like by means of complex formers adapted to react and enter into a combination with the substances to be separated. The method is characterized by adding to the aqueous solution bubbles formed by cells of living organisms the content of which has an osmolarity differing within limitation from osmolarity of the aqueous solution. The complex formers are added to a solution the osmolarity of which is lower than the cell content of the cells. Due to the osmosis through the cell skin acting as diaphragm, the state of equilibrium between the solution in the interior of the cells and the solution containing the complex formers, the cell content practically corresponds to the solution containing the complex formers. The osmolarity of the solution containing the complex formers is increased by adding osmotically active substances selected from the group consisting of calcium ions, potassium ions, sodium ions. Subsequently the bubbles formed by the exchange of the cell content of the cells and containing the complex formers are separated from the solution containing the complex. Then the separated bubbles are introduced into the aqueous solution until the substance to be separated has moved into the interior of the bubbles and then the cells are separated from the aqueous solution. (Sinha - OEIS)
W78-00295

WASTE WATER SAMPLING SYSTEM,
For primary bibliographic entry see Field 5A.
W78-00301

PROCESS FOR REMOVING MONOHYDRIC AND POLYHYDRIC PHENOLS FROM WASTE WATER,
Metallgesellschaft A. G., Frankfurt am Main (West Germany). (Assignee).
H. M. Stonner, and P. Wiesner.
U.S. Patent No. 4,025,423, 5 p, 1 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 958, No 4, p 1657, May 24, 1977.

Descriptors: *Patents, *Waste water treatment, *Chemical wastes, *Water pollution treatment, Organic compounds, Chemical reactions, *Phenols, Hydrogen sulfide, Ammonia, Separation techniques, Distillation, *Chemical wastes.
Identifiers: Coal gasification or degasification.

Monohydric and polyhydric phenols are removed from waste water together with hydrogen sulfide, free and combined ammonia, by extraction and distillation. The waste water is formed during the degasification or gasification of coal and is subsequently subjected to biological purification. The steps of the process are as follows: Removing a major portion of the monohydric phenol, part of the polyhydric phenol and any free fatty acids present in the waste water by extraction with a small amount of a non-saponifying organic solvent; separating the phenols from the extract by distillation; removing a major portion of the polyhydric phenols, the remaining monohydric phenols and any free acids by a single or repeated extraction with a large amount of the same organic solvent; transforming the phenols in the extract to their salts by treatment with an aqueous alkaline solution, washing the salts out and separating the mixture into an organic phase and an aqueous phase, recycling the solvent-containing organic phase; recovering the free phenols using surplus carbon dioxide; and separating the free phenols by decanting and/or extraction with the organic solvent. (Sinha - OEIS)
W78-00303

APPARATUS AND METHOD USING ACTIVATED CARBON TO PURIFY LIQUID WASTES,
Eastman Kodak Co., Rochester, NY. (Assignee).
R. J. Anderson, and R. B. Leon.
U.S. Patent No. 4,025,426, 10 p, 5 fig, 14 ref; Official Gazette of the United States Patent Office, Vol 958, No 4, p 1658, May 24, 1977.

Descriptors: *Patents, *Waste water treatment, *Water pollution treatment, Industrial wastes, Water purification, *Activated carbon, Adsorption, Separation techniques, Liquid wastes.

An apparatus and method utilizing activated carbon to remove impurities from liquids comprises an adsorption column containing stacked carbon containers. Each of the containers holds an activated carbon bed, has an opening above the level of the bed to permit introduction of oxygen, steam or other gas, and has means for permitting passage of liquid from the container. Liquid to be purified enters the top of the column, flows through the carbon beds and out of the column. A control module monitors the effectiveness of the column and generates signals to control the reactivation of the carbon by heating the carbon containers and passing steam into the individual containers. Provision is made for using hydrostatic pressures to increase the rate of flow of liquids through the apparatus. Oxygen, another oxidizing gas or a gaseous mixture promotes aerobic growth to destroy impurities adsorbed by the carbon thus extending the useful life of the column. (Sinha - OEIS)
W78-00304

PROCESS FOR THE PURIFICATION OF INDUSTRIAL EFFLUENTS,
CIBA-GEIGY Corp., Ardsley, NY. (Assignee).
H. Wegmuller, and J. Haase.
U.S. Patent No. 4,025,428, 9 p, 12 ref; Official Gazette of the United States Patent Office, Vol 958, no 4, p 1659, May 24, 1977.

Descriptors: *Patents, *Waste water treatment, *Industrial wastes, *Water pollution treatment, Water purification, Organic wastes, Color, Pulp and paper industry, Tannery wastes, Dyes.
Identifiers: *Decolorization, Formaldehyde.

It has been found that a complete or very extensive purification, including decolorization of industrial effluents is achieved if these are brought into contact with absorbents which consist of cellulose pretreated with precipitants. The process is suitable for the removal of anionic dyestuffs, opti-

cal brighteners, dyeing auxiliaries and washing agents, and for the elimination of residues of tanning agent. Three process are suitable for this purpose: the water is stirred with the pretreated cellulose material and then separated; the pretreated cellulose material is kept in suspended state by the counter-current flow of the water; and a filtration process where the water is passed through pre-treated cellulose filter material. The filtration process is preferable. The cellulose to be used as the carrier material consists of bleached or unbleached spruce sulphite cellulose, Kraft cellulose or waste sheets from printing. The cellulose can be in the form of granules, filter paper or paper pulp. Suitable precipitants are water soluble basic aminoplasts such as formaldehyde-dicyandiamide condensation products. (Sinha-OEIS)
W78-00305

PROCESS FOR THE PURIFICATION OF INDUSTRIAL EFFLUENT,
CIBA-GEIGY Corp., Ardsley, NY. (Assignee).
H. Neuschutz.
U.S. Patent No. 4,025,429, 8 p, 2 tab, 7 ref; Official Gazette of the United States Patent Office, Vol 958, no 4, p 1659, May 24, 1977.

Descriptors: *Patents, *Waste water treatment, *Industrial wastes, *Water pollution treatment, *Water quality control, Organic wastes, Separation techniques, Flocculation, Chemical reactions, Color, Pulp and paper industry, Tannery wastes, Dyes.
Identifiers: Decolorization, Formaldehyde.

A process is disclosed for the purification of effluent which results in the textile, paper and leather industries and in the manufacture of dyestuffs, and which contains water-soluble, anionic dyestuffs or optical brighteners. The process for the effective decolorization of residual liquors, comprises the addition of a water-soluble formaldehyde condensation product to the effluent and the subsequent removal of the occurring flocculate from the effluent. Especially suitable water-soluble formaldehyde condensation products are condensation products from dicyandiamide or dicyandiamidine, optionally urea, formaldehyde and, optionally, an alkylenepolyamine having 2 to 8 carbon atoms. (Sinha-OEIS)
W78-00306

REMOVAL OF METAL IONS FROM WASTE WATER,
Amax, Inc., New York. (Assignee).
R. F. Pagel.
U.S. Patent No. 4,025,430, 6 p, 2 fig, 2 tab, 6 ref; Official Gazette of the United State Patent Office, Vol 958, no 4, p 1659, May 24, 1977.

Descriptors: *Patents, *Waste water treatment, *Industrial wastes, *Heavy metals, Water pollution sources, Water pollution treatment, *Zinc, Chemical reactions, Separation techniques, Hydrogen ion concentration, *Chemical precipitation, Ions.
Identifiers: Hydrometallurgy.

The invention is directed to a method for removing metal ion impurities from industrial waste water and is particularly applicable to the treatment of aqueous effluents obtained in the hydrometallurgy of zinc. The method comprises the sequential steps of neutralizing the waste water with slaked lime to a final pH of at least about 8.5 to precipitate hydroxides of metals which form residual quantities of metal ions other than Mg, Ca, Na and K, capable of being removed from the solution by the addition of a soluble silicate solution, separating the effluent from the hydroxide precipitate, adding to the effluent a soluble silicate solution in an amount at least sufficient to remove the residual metals ions from the solution, and then separating the silicate-treated effluent from the precipitate. (Sinha-OEIS)
W78-00307

INTRODUCTION TO WASTEWATER TREATMENT PROCESSES,
Laval Univ., Quebec.
R. S. Ramalho.
Academic Press (New York, San Francisco, London). 1977. 409 p.

Descriptors: *Waste water treatment, *Municipal wastes, *Industrial wastes, *Waste treatment, Wastes, *Water pollution treatment, Aeration, *Sewage treatment, Sedimentation, Flotation, Neutralization, Activated sludge, Oxidation lagoons, Trickling filters, Anaerobic digestion, *Sludge treatment, Dewatering, Filtration, Centrifugation, Digestion, *Tertiary treatment, Suspended solids, Carbon, Adsorption, Ion exchange, Reverse osmosis, Electrodialysis, Chlorination, Ozone, Nutrient removal, Ecology, Economics, Engineering, Water pollution control, *Water reuse.

The 8 chapters of this textbook deal with the characterization (BOD, etc.) of domestic and industrial waste waters; the theory and practice of effluent aeration (oxygen transfer kinetics, air diffusion, turbine and surface aerators, etc.); pretreatment and primary treatments (screening, sedimentation, flotation, neutralization); activated sludge and other aerobic secondary treatments (extended aeration or total oxidation, aerated lagoons, stabilization ponds, trickling filters); anaerobic treatment; sludge processing (thickening, dewatering, pressure and vacuum filtration, centrifugation, digestion, etc.) and disposal; tertiary treatments (suspended solids removal, carbon adsorption, ion-exchange, reverse osmosis, electrodialysis, chlorination, ozonization, nutrient removal, etc.); and the general ecological, economic, and engineering aspects of water pollution abatement and water reuse. A subject index is appended, and student problems and further reading references are given after each chapter. (Brown-IPC)
W78-00360

CONTINUOUSLY OPERATING SAND FILTER (KONTINUIERLICH ARBEITENDER SAND-FILTER),
P. J. Metzger.
Allgemeine Papier-Rundschau, No. 16, p 409-410, 412, April 20, 1977. 4 fig, 3 tab.

Descriptors: *Filters, *Sands, *Waste water treatment, Industrial water, Cleaning, Equipment, Water pollution control, Water pollution treatment, Filtration.
Identifiers: *Sand filters.

A description is given of a continuous sand filter of use in waste water purification which is characterized by an improved sand bed recirculation system with intensive cleaning of each sand grain. The recirculation system is designed to result in a conical top surface of the filter bed with coarse grains concentrated at this surface. (Speckhard-IPC)
W78-00361

SANITARY-HYGIENIC EVALUATION OF THE EXTRACTION METHOD OF WATER REGENERATION FROM ATMOSPHERIC MOISTURE, (IN RUSSIAN),
Yu. E. Sinyak, L. A. Kuznetsova, M. I. Shikina, A. G. Fil'chakov, and V. V. Krasnoshchekov.
Kosm Biol Med. 6(3), p 22-24, 1972.

Descriptors: *Waste water treatment, *Moisture, Acids, *Separation techniques, Organic acids, Water purification, *Activated carbon, Public health, Potable water.
Identifiers: Phosphonic-acid, Atmospheric moisture.

Tri-N-Octylamine (TOA), di-n-nonyl-amine and di-Z-ethylhexylphosphonic acid (DI-2) were used as extracting agents to purify water obtained from air moisture. The purified water is designated for human use in closed ecological systems such as spaceships. Water with TOA and DI-2 was toxic for water fleas and frog heart. Purification of the water using activated C removed toxic contaminants and met sanitary-hygienic requirements.--Copyright 1975, Biological Abstracts, Inc.
W78-00362

TREATMENT AND USE OF WASTE EFFLUENT STREAMS,
Lummus Co., New York.
R. T. Whitehead, B. J. Luberoff, and M. C. Sze.
Canadian Patent No. 1,009,566. May 3, 1977. 18 p, 15 claims, 2 fig.

Descriptors: *Pulp wastes, *Waste water treatment, *Water reuse, *Patents, *Chemical precipitation, *Heat exchangers, *Cooling towers, Water pollution treatment, Waste treatment, Industrial wastes, Water pollution sources, Wastes, Pulp and paper industry, Effluents, *Water purification.

A process is provided for purification of an aqueous waste stream containing suspended or dissolved chemical matter, such as a waste stream from a thickener in a pulp or paper mill. The process comprises subjecting the waste stream to a cooling tower operation in which at least a portion of the water contained in the stream is vaporized and at least a portion of the chemical content is precipitated, separating and recovering the precipitated chemical content, passing the remaining aqueous stream in indirect heat exchange with at least one process stream, and returning the heat-exchanged aqueous stream to the cooling tower. (Lynch-IPC)
W78-00364

PRODUCTION OF FOOD YEAST FROM SPENT SULFITE LIQUOR,
Boise Cascade Paper Group, Salem, OR.
R. F. Anderson.
Canadian Pulp and Paper Association, Annual Meeting (Montreal), 1976, Preprints, p 9-13B. 2 fig, 5 ref, 3 tab.

Descriptors: *Pulp wastes, *Waste water treatment, *Yeasts, Wastes, Industrial wastes, Waste treatment, Water pollution treatment, Water pollution sources, Pulp and paper industry, Effluents, Oregon, Water pollution control, Sulfite liquors, Byproducts, Foods, *Fermentation, Carbohydrates.
Identifiers: *Spent sulfite liquors, Sulfite pulp mills, Candida utilis, Sugars.

The production of food yeast from sugars contained in sulfite mill waste waters by Boise Cascade Corp., Salem, Oregon, is described. Candida utilis is grown in two fermenters using Waldhof aeration systems. The yeast product is rendered inactive by pasteurization and spray dried. The dried yeast powder is sold to the food-processing industry where it is used as an ingredient in yeast hydrolyzates and seasoning mixes for food products. (Witt-IPC)
W78-00365

BIOLOGICAL TREATMENT OF SPENT LIQUOR FROM HIGH-YIELD BISULFITE PULPING OPERATION. PART I,
Consolidated-Bathurst, Ltd., Montreal (Quebec).
K. Goel, R. Paquin, Y. M. Mehta, and Y. Lemay.
Canadian Pulp and Paper Association, Annual Meeting (Montreal), 1976, Preprints, p 101-107A. 8 fig, 6 ref, 5 tab.

Descriptors: *Pulp wastes, *Waste water treatment, *Activated sludge, Wastes, Industrial wastes, Waste treatment, Water pollution treatment, Water pollution sources, Pulp and paper industry, *Biological treatment, *Biochemical oxygen demand, Nutrients, Capital costs, Operating

costs, Pilot plants, Water pollution control, Sludge, Sulfite liquors, *Biodegradation.
Identifiers: Spent sulfite liquors, Sulfite pulp mills.

Biodegradation of spent liquor from high-yield bisulfite pulping was investigated to determine the feasibility of using the activated sludge process for BOD reduction. Process variables such as liquor concentration, detention time, BOD loading, and amounts of nutrients were studied. A two-stage system was selected because of superior BOD removal efficiency and sludge settling characteristics. A 1000 gal/da pilot plant was designed and run successfully for 9 months. Results showed that approximately 90% of the BOD could be eliminated. Capital and operating costs of $5,000,000 and $500,000/yr, respectively, were estimated for a mill producing 250 tons/day of high-yield bisulfite pulp. (See also W78-00367) (Witt-IPC)
W78-00366

BIOLOGICAL TREATMENT OF SPENT LIQUOR FROM HIGH-YIELD BISULFITE PULPING OPERATION. PART II,
Consolidated-Bathurst Ltd., Montreal (Quebec).
K. Goel, R. Paquin, Y. M. Mehta, and Y. Lemay.
Canadian Pulp and Paper Association, Annual Meeting (Montreal), 1976, Preprints, p 109-114A. 9 fig, 6 ref, 3 tab.

Descriptors: *Pulp wastes, *Waste water treatment, *Activated sludge, Sulfite liquors, Wastes, Industrial wastes, Waste treatment, Water pollution treatment, Water pollution sources, Pulp and paper industry, *Biological treatment, Biochemical oxygen demand, Sludge, Flotation, *Separation techniques, Foaming, Sludge disposal, Water pollution control.
Identifiers: Spent sulfite liquors, Sulfite pulp mills.

In any activated sludge biological treatment system, separation of the mixed liquor into a concentrated stream of biological solids and clarified effluent is essential. The design of the activated waste treatment plant, therefore, should not be limited to consideration of the biological aspects of the process but also give due attention to solid-liquid separation. A laboratory study was made of the factors influencing the rate of solid/liquid separation. The results of the 'batch flux' method of analysis for designing a full-scale sedimentation clarifier are presented. The study also includes the trials performed using a continuous-flow pilot flotation unit for solid/liquid separation of the mixed liquor and for thickening and disposal of excess biological sludge. Analysis of the data show that an aeration tank loading of 225 lb of 5-day BOD/1000 cu ft/day (mixed liquor suspended solids approximately 5000 ppm) and 200% sludge recycle, the limiting clarifier solids loading would be about 35 lb/day/sq ft. Dissolved air flotation was impractical for solid/liquid separation of the mixed liquor because of excessive foaming. The studies also showed that the sludge can be digested together with wood chips during high-yield bisulfite pulping without any significant effect on pulp quality and BOD of the spent sulfite liquor. (See also W78-00366) (Witt-IPC)
W78-00367

TOXICITY OF PULP AND PAPER MILL EFFLUENTS,
British Columbia Research Council, Vancouver.
For primary bibliographic entry see Field 5C.
W78-00369

A PROMISING NEW PROCESS FOR REMOVING HEAVY METALS FROM WASTEWATER,
J. E. Hanway, Jr., R. G. Mumford, and D. G. Barth.
Civil Engineering, Vol 46, p 78-79, October, 1976.

Descriptors: *Heavy metals, *Waste water(Pollution), *Waste water treatment, Zinc, Lead, Copper, Iron, Water pollution sources, Cellulose, *Recycling, Water pollution control, Metals, *Chemical precipitation.
Identifiers: *Cellulose xanthate.

A dosage of 90 mg of cellulose xanthate/liter of waste water reduced the concentration of lead and zinc to 30 micrograms/liter or less and reduced the concentration of copper and iron to an acceptable level. It is suggested that the process may be adaptable to a closed-cycle operation with recycle, recovery, and reuse of reagents and products. (Buchanan-IPC)
W78-00370

OPTIMIZATION OF WATER MANAGEMENT IN THE PRODUCTION OF WOOD FIBERBOARD USING THE WET PROCESS (K RACIONALIZACII VODNEHO HOSPODARSTVA VO VYROBE DREVOVLAKNITYCH DOSAK MOKRYM SPOSOBOM),
Research and Development Inst. of Wood and Timber, Bratislava (Czechoslovakia).
For primary bibliographic entry see Field 3E.
W78-00371

DETERMINATION OF FREE SULFUR DIOXIDE IN SPENT SULFITE LIQUOR AND PAPER MILL EFFLUENTS USING A SELECTIVE ELECTRODE (DETERMINAZIONE DI ANIDRIDE SOLFOROSA LIBERA NEL LISCIVO SOLFITICO ESAUSTO ED IN ACQUE DI SCARICO DE CARTIERA MEDIANTE ELETTRODO SELETTIVO),
Istituto di Fisica dell'Atmosfera, Bologna (Italy).
For primary bibliographic entry see Field 5A.
W78-00373

REVERSE OSMOSIS AND ULTRAFILTRATION APPLIED TO THE PULP INDUSTRY (OSMOSE INVERSE ET ULTRAFILTRATION APPLIQUEES A L'INDUSTRIE DES PATES),
U. Haagensen.
Papier, Carton et Cellulose, Vol 26, No 4, p 46-52, April, 1977. 14 fig, 1 illus, 1 tab.

Descriptors: *Pulp and paper industry, *Waste water treatment, *Reverse osmosis, Wastes, Industrial wastes, Waste treatment, Water pollution treatment, Water pollution sources, Boiler feed water, Bleaching wastes, Economics, Energy, Membrane processes, Separation techniques, *Pulp wastes, Proteins, Biological treatment.
Identifiers: *Ultrafiltration, Spent sulfite liquors, Black liquors, Condensates, Fiberboard mills, Semichemical pulp mills, Paper mills.

Following an introduction to the general principles of effluent treatment by membrane filtration, the use of reverse osmosis and ultrafiltration in the concentration and/or purification of spent sulfite liquors, evaporator condensates, black liquor, boiler feedwater, and effluents from fiberboard mills, semichemical pulp mills, bleach plants, barking operations, and paper mills is examined. The energy consumption and economy of each of the processes is also considered. The combination of the two processes in effluent recovery as well as in the production of proteins and in biological treatment of effluents is discussed. (Speckhard-IPC)
W78-00377

CHARACTERIZING EFFLUENT VARIABILITY FROM PAPER INDUSTRY WASTEWATER TREATMENT PROCESSES EMPLOYING BIOLOGICAL OXIDATION,
Tufts Univ., Medford, MA.
For primary bibliographic entry see Field 5B.
W78-00378

EFFECT OF CONSTRUCTIONAL AND OPERATIONAL FACTORS ON THE EFFICIENCY OF SLUDGE DEWATERING IN SEDIMENTATION CENTRIFUGES (WPLYW CZYNNIKOW KONSTRUKCYJNYCH I EKSPLOATACYJNYCH NA EFEKTYWNOSC ODWADNIANIA OSADOW W WIROWKACH SEDYMENTACYJNYCH),
Technical Univ., Lodz (Poland). Inst. of Papermaking and Paper Machinery.
P. Stanislawczyk.
Przeglad Papierniczy, Vol 33, No 3, p 99-103, March, 1977. 8 fig, 9 ref, 2 tab.

Descriptors: *Sluge treatment, *Centrifugation, *Dewatering, Construction, Operation and maintenance, *Waste treatment, Water pollution treatment, Water pollution sources, Suspended solids, Pulp wastes, Efficiencies, Pulp and paper industry, *Waste water treatment, Water pollution treatment, Industrial wastes, Treatment facilities, Equipment.
Identifiers: *Sedimentation centifuges.

The principle and construction of sedimentation centrifuges, and the effect of process variables on the quantitative and qualitative separation of suspended solids are discussed. The variables considered are the flow rate of the suspension, angular velocity of the centrifuge cylinder, width of the centrifuged suspension ring, concentration of the suspension entering the centrifuge, centrifuge cylinder shape, ash content in the suspension, and the addition of flocculants. It is pointed out that there is a certain optimum combination of process variables depending on the properties of the suspension being centrifuged, which can be established only experimentally. Examples are given of applications of centrifuges to the thickening and dewatering of pulp and paper industry effluents, and the efficiency of the process is indicated. (Stapinski-IPC)
W78-00379

UDDEHOLM-KAMYR BLEACH PLANT WITH CLOSED WATER SYSTEM (BIELARNIA TYPU UDDEHOLM-KAMYR O ZAMKNIETYM OBIEGU),
Uddeholm A.B., Skoghall (Sweden).
K. A. Andersson.
Przeglad Papierniczy, Vol. 33, No. 3, p 103-106, March, 1977. 6 fig, 1 tab.

Descriptors: *Bleaching wastes, *Waste water treatment, *Adsorption, *Resins, Water pollution treatment, Water pollution sources, Pulp and paper industry, Color, Biochemical oxygen demand, Capital costs, Operating costs, Costs, Foreign countries, Europe, Chlorine, Effluents.
Identifiers: Kraft mills, Sweden, Closed systems.

A description is given of a system for the purification of bleaching effluents with an adsorption resin, designed for closed-cycle bleach plants. Results obtained in the purification of effluent from the first-stage alkali extraction and the overall bleaching effluent are presented, including the reduction of color and BOD and the chlorine balance. Investment and operating costs are estimated for a purification system for a closed-cycle bleach plant producing 500 tons/day of bleached kraft pulp. An Uddeholm-Kamyr bleach plant coupled with an effluent purification system will be constructed in Skoghall, Sweden. The plant will have a capacity of 250 tons/day. (Stapinski-IPC)
W78-00380

CONTINENTAL (GROUP INC.)'S APPROACH FOR REDUCED PAPER MILL WATER CONSUMPTION AND ITS EFFECT ON ENERGY USE,
Continental Group, Inc., Hodge, LA.
For primary bibliographic entry see Field 3E.
W78-00381

NEW MILL DESIGN – A PRESENT DAY APPROACH TO REDUCED WATER USAGE,
Wheelabrator-Frye Inc., Birmingham, AL.
For primary bibliographic entry see Field 3E.

W78-00382

WHITE WATER INVENTORYING,
J. B. Jackson.
Southern Pulp and Paper Manufacturer, Vol. 40, No. 6, p 37-38, June, 1977. 3 fig, 1 tab.

Descriptors: *Pulp wastes, *Waste water treatment, Effluents, Industrial wastes, Wastes, Industrial water, Water pollution sources, South Carolina, Monitoring, Water conservation, Dissolved solids.
Identifiers: *White water(Paper machines), Paper mills, Corrugating medium(Fluting paper).

A method of controlling the process waters at Sonoco Products Co.'s corrugating medium mill at Hartsville, South Carolina, is described. This approach consists of a monitoring system that totalizes the water in all pulp stock and water chests in the paper mill. This allows production personnel to discharge a minimum constant amount of process water (white water) as effluent and, at the same time, minimize fresh water usage. This approach has reduced the fiber loss by 68%, specific effluent flow (gallons/ton) by 35-46%, and the dissolved solids discharged to effluent by 48-53% in the 400 ton/day mill. (Witt-IPC)
W78-00383

CONTROL OF BOD LOAD ON ACTIVATED SLUDGE IN AERATION TANKS (OPERATIVNOE REGULIROVANIE NAGRUZKI NA IL V AEROTENKAKH),
Nauchnyi Planovii Otdel Bumazhnoi Promyshlennosti, USSR.
M. A. Evilevich, L. K. Korovin, and I. M. Kas'yanik.
Bumazhnaya Promyshlennost', No. 3, p 27-28, March, 1977. 3 fig.

Descriptors: *Activated sludge, *Biochemical oxygen demand, *Aerated lagoons, *Waste water treatment, Wastes, Waste treatment, Water pollution treatment, Sedimentation, Biological treatment, Capital costs, Water purification, Water pollution control, Pulp waste.

Experiments have shown that deviation of the 5-day BOD load from the optimum value results in worsening of activated sludge sedimentation and in disruption of the biological purification process. The BOD load in an aeration tank without an activated sludge regenerator is determined by the effluent flow rate and BOD, activated sludge concentration, and equipment volume. The first two parameters depend on local purification conditions and cannot be controlled. Adjustment of the equipment volume requires considerable investment and cannot be used for current process control. Thus, the only controllable parameter is activated sludge concentration. A reduction of this concentration to below 2 g/liter can affect the stability of the process, and an increase to over 3 g/liter has a detrimental effect on the operation of secondary sedimentation tanks. Consequently, maintenance of suitable BOD requires, as a rule, a lowering of the tank output. On the other hand, an activated sludge regenerator can solve the control problem. The actual 5-day BOD load on the activated sludge can be calculated in this case from the aforementioned parameters and from the regeneration and the recirculation coefficients. The latter, within the 0.4-1.0 range, has no effect on the purification efficiency, but its small variations can be used to control the load within a wide range. Experimental curves are presented showing the effect of the recirculation coefficient on the BOD load at regeneration coefficients of 0.25, 0.50, and 0.75. (Stapinski-IPC)
W78-00388

WE SHARE OUR EXPERIENCE (IN BOARD MILL EFFLUENT TREATMENT) (DELIMSYA OPYTOM),
Stupinskaya Kartonnaya Fabrika, Stupino (USSR).
L. B. Fedotovskii.
Bumazhnaya Promyshlennost', No. 4, p 22-23, April, 1977.

Descriptors: *Pulp wastes, *Waste water treatment, Wastes, Industrial wastes, Waste treatment, Water pollution treatment, Water pollution sources, Pulp and paper industry, Effluents, Foreign countries, Filters, Sands, Sedimentation, Suspended solids, Hydrogen ion concentration, Gravels, Quartz, Biochemical oxygen demand, Water reuse, Sludge, Dewatering, Water purification.
Identifiers: Board mills, Soviet Union(USSR), Aluminum sulfate, Polyacrylamide.

The Stupino board mill (USSR) manufactures imitation chromo board from waste paper, chemical pulp, and groundwood. The production of multicolor printed carton blanks began in 1974, and in the same year an extensive mechanical effluent purification system was put into operation. The effluents from the board mill and auxiliary plants (up to 65,950 cu m/day) first pass through sand traps and then to radial sedimentation tanks, where sedimentation of suspended solids is intensified by the addition of aluminum sulfate in an amount sufficient to give a pH of 5.5-6.5. The clarified effluents then undergo a second purification stage in contact clarifiers filled with gravel and layers of quartz sand of different granular composition. The purified effluents have a pH of 6.8-7.3, a suspended solids content of 2-10 mg/liter, and a 5-day BOD of 8 g/liter, i.e., have properties conforming to sanitary standards. About 70% of the purified effluents are recycled to the mill as a replacement for fresh process water. The dewatering of sludge from the radial sedimentation tanks is done in vacuum filters using polyacrylamide as an additive. (Stapinski-IPC)
W78-00389

STUDY OF FILTRATION PROPERTIES OF WASTE WATERS (ISSLEDOVANIYA FIL'TRATSIONNYKH SVOISTV STOCHNYKH VOD),
G. P. Kuchin, E. M. Bakaeva, L. A. Makarova, and S. A. Kister.
Bumazhnaya Promyshlennost', No. 4, p 23-24, April, 1977. 2 fig.

Descriptors: *Pulp wastes, *Filtration, Wastes, Industrial wastes, Water pollution sources, Effluents, Pulp and paper industry, *Waste water treatment.
Identifiers: *White water(Paper machine), Filter paper, Parchment paper, Magazine paper, Cotton pulp, Sulfite pulp.

The filterability properties of white water from the manufacture of filter paper (100% cotton pulp), parchment base paper (100% bleached sulfite pulp), and magazine paper (100% bleached sulfite pulp containing starch, kaolin, and size) were studied in a laboratory equipment modeling the Waco filter as a function of the initial concentration of the suspension (180-2400 mg/liter). The filterability of white water from cotton pulp was nearly 100% and was independent of the suspension concentration. In the case of white water from pulp containing a filler and other additives, a high filtration effect (65-70%) was obtained at a concentration of 600-700 mg/liter. At higher concentrations the filtration effect was higher by 5-10%, but the filtration rate was much lower. The use of a sublayer increased the filtration effect to 95%, but did not increase the filtration rate. Thus, to avoid low filter efficiency, the suspension concentration should be maintained at not more than 700 mg/liter. (Stapinski-IPC)
W78-00390

PROCESS FOR CLARIFYING (PAPER-)COATING PLANT EFFLUENTS--A CONTRIBUTION TO THE IMPROVEMENT OF ENVIRONMENTAL PROTECTION (VERFAHREN ZUR KLAERUNG VON STREICHEREIABWAESSERN -- BEITRAG ZUR VERBESSERUNG DES UMWELTSCHUTZES),
Feinpapierfabrik Koenigstein VEB (East Germany).
U. Huettenrauch.
Zellstoff und Papier, Vol. 26, No. 5, p 150-152, May, 1977. 1 fig, 3 ref, 2 tab.

Descriptors: *Pulp wastes, *Waste water treatment, *Coagulation, Wastes, Industrial wastes, Waste treatment, Water pollution treatment, Water pollution sources, Pulp and paper industry, Proteins, Water purification, Chemical precipitation, Effluents.
Identifiers: Paper mills, Photographic paper.

A method is described for the clarification of paper mill effluents, and especially paper-coating plant effluents from the manufacture of photographic base paper. The method is particularly suited to treating effluents containing collagen-type proteins and is based on clarification via colloid chemical reactions. It has the advantage that existing clarification plants can be used to remove the coagulated solids. Results are reportedly good as regards recovery of materials and pollution control. (Speckhard-IPC)
W78-00391

IMPACT OF CHLORINATION PROCESSES ON MARINE ECOSYSTEMS,
Environmental Research Lab., Gulf Breeze, FL.; and Environmental Research Lab., Johns Island, SC. Bears Bluff Field Station.
For primary bibliographic entry see Field 5C.
W78-00413

APPLICATION OF A NEW NONLINEAR PROGRAMMING CODE WITH DECOMPOSITION TO THE REGIONAL WASTEWATER-COLLECTION AND TREATMENT-LOCATION PROBLEM,
West Virginia Univ., Morgantown. Computer Center.
For primary bibliographic entry see Field 5G.
W78-00448

PROTECTION OF VIRUSES DURING DISINFECTION BY ADSORPTION TO PARTICULATE MATTER,
Maine Univ. at Orono. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W78-00450

APPLICATION OF REVERSE OSMOSIS AND ULTRAFILTRATION TO THE PURIFICATION OF PULP AND PAPER INDUSTRY EFFLUENTS. (2) (ZASTOSOWANIE ODWROCONEJ OSMOZY I ULTRAFILTRACJI DO OCZYSZCZANIA SCIEKOW Z PRZEMYSLU CELULOZOWO-PAPIERNICZEGO),
Instytut Inzenierii Ochrony Srodowiska Politechniki Slaskiej (Poland).
M. Bodzek, and O. Kominek.
Przeglad Papierniczy, Vol. 33, No. 3, p 82-86, March, 1977. 8 fig, 13 ref, 2 tab.

Descriptors: *Pulp wastes, *Waste water treatment, *Reverse osmosis, Wastes, Waste treatment, Industrial wastes, Water pollution treatment, Water pollution sources, Pulp and paper industry, Membrane processes, Cellulose, Inorganic compounds, Lignins, Color, Effluents.
Identifiers: *Ultrafiltration, Cellulose acetate, Sugars.

The feasibility of purifying pulp and paper mill effluents by reverse osmosis and ultrafiltration has been demonstrated by experimental work, includ-

ing the preparation of cellulose acetate membranes and their characterization and evaluation for the purification of mill effluents. Also described is the laboratory apparatus in which the membranes were tested to determine the effects of pressure, solution concentration, and the temperature of thermal treatment of the membranes on the rate of filtration and the degree of separation. Solutions of sodium and calcium chlorides, sodium and magnesium sulfates, sodium sulfite, sodium acetate, and sucrose were used in membrane tests. Results showed that reverse osmosis membranes are suitable for the removal of inorganic compounds and reducing sugars from effluents within the concentration range 1-10 g/liter and a pressure of up to 40 atmospheres (gage). The ultrafiltration membranes can be used for removal of colored lignin products. These findings need to be confirmed in industrial tests with actual effluents and lignin compounds. (stapinski-IPC)
W78-00453

USE OF CHITOSAN FOR THE REDUCTION AND RECOVERY OF SOLIDS IN POULTRY PROCESSING WASTE EFFLUENTS,
Georgia Univ., Experiment. Dept. of Food Science; and Georgia Experiment Station, Experiment.
W. A. Bough, A. L. Shewfelt, and W. L. Salter.
Poultry Science, Vol 54, p 992 - 1000, 9 tab, 19 ref. 1975.

Descriptors: *Chemical precipitation, *Coagulation, *Food processing industry, *Poultry, *Recycling, *Water reuse, Chemical oxygen demand, Cost analysis, Flotation, Flocculation, Laboratory test, Suspended solids, *Waste water treatment, Water analysis.
Identifiers: *Poultry processing wastes, *Chitosan.

Treatment of poultry processing wastes with chitosan as a coagulating agent reduced suspended solids in the composite effluents by 74 -94%. The combined effects of chitosan and dissolved air flotation (DAF) reduced suspended solids and COD in the chiller effluent by 82% and 62%, respectively, and in the scalder effluent by 77% and 46%. The dry coagulated solids from the chiller effluent contained 35.0% crude protein and 49.1% fat by DAF and 54.0% crude protein and 29.4% by coagulation and gravity settling. The yields of dry coagulated solids from the chiller, scalder, and composite effluents were 2.7, 1.5, and 2.8 lb/1000 gal. Corresponding requirements for chitosan, estimated to cost $1/lb., were 0.04, 0.05, and 0.25 lb./1000 gal. The value of coagulated by-products as animal feed supplements, the reduction in total waste load, and the possibility of recycling clarified chiller and scalder effluents commend coagulation pretreatment and by-product recovery. Since chitosan is derived from shrimp and crab solid wastes, the coagulated solids could feasibly be rendered with other poultry by-products into feed supplements if official approval for use is obtained. (Prodehl - EPA, Corvallis)
W78-00457

INDUSTRIAL WASTE PROCESS DESIGN,
Manhattan Coll., Bronx, NY. Dept. of Civil Engineering.
W. W. Eckenfelder, Jr., and D. J. O'Connor.
Proceedings American Society of Civil Engineers, February 15-19, 1954, Sanitary Engineering Division, Vol 80, No 411, p. 411-1 to 411-25. 13 fig, 5 tab, 26 ref.

Descriptors: *Aerobic treatment, *Chemical precipitation, *Sedimentation, Water analysis, Activated sludge, Anaerobic conditions, Biochemical oxygen demand, Chemical oxygen demand, Coagulation, Design data, Food processing industry, Trickling filters, Suspended solids, *Waste water treatment.
Identifiers: *Meatpacking wastes.

Procedures for data collection and analysis from the industrial waste survey are presented. Laboratory procedures, including pilot plant functions are discussed. The theory and application of sedimentation, activated sludges (with application to tirckling filters), and chemical treatment are discussed, and applications given to specific waste problems and studies from cannery, pulp and paper, packinghouse, dairy and paint wastes. Design criteria are presented in the form of a process material and flow balance. Statistical methods applied to analysis and design criteria are discussed. (Prodehl - EPA, Corvallis)
W78-00459

CONSERVATION OF WATER IN FOOD PROCESSING BY USE OF LOW VOLUME HIGH PRESSURE SPRAYS,
North Carolina State Univ. at Raleigh. Dept. of Food Science.
For primary bibliographic entry see Field 3E.
W78-00460

FULL-SCALE MODIFIED DIGESTION OF MEAT PACKING WASTES,
Wilson and Co., Inc., Chicago, IL. Research and Technical Dept.
A. J. Steffen.
Sewage and Industrial Wastes, Vol 27, No 12, p 1364-1368, Dec 1955, 2 fig, 1 tab, 2 ref. Presented at 1955 annual meeting Central States Sewage and Industrial Wastes Assn., Rochester, Minn, June 22 - 24, 1955.

Descriptors: *Anaerobic digestion, *Food processing industry, *Treatment facilities, Cost comparisons, Design data, Sludge digestion, *Waste water treatment, Minnesota.
Identifiers: *Meat packing wastes, Degassification.

The first full-scale modified digestion facility to treat meat processing wastes will be constructed at Wilson and Co., Albert Lea, Minn. The design is based on the studies conducted on a pilot-scale plant at Austin, Minn. by Geo. A. Hormel and Co. with the cooperation of the American Meat Institute. Evaluation of the process for full-scale development revealed that an anaerobic digestion plant can be built for two-thirds the cost of a conventional two-stage trickling filter plant, however, operating costs are slightly higher due to power requirements in mixing and degassification. The hydraulic profile and unit loadings on which the design is based are presented. One hundred percent flow equalizations and maintenance of 95F in the digesters is proposed. Open turbine digester mixing will be installed in the first stage plant. Degassifiers will consist of two vertical steel tanks, each 11 feet in diameter and 9 feet deep where the effluent is pulled under 20 inch vacuum. The design provides for aerobic treatment by a single-pass high-rate trickling filter followed by final clarifiers and chlorination. (Prodehl - EPA, Corvallis)
W78-00461

AN INVESTIGATION INTO THE DISPOSAL OF BLOOD BY ANAEROBIC DIGESTION,
Kent Sewage Treatment Plant, OH.
K. B. Singleton.
Sewage and Industrial Wastes, Vol 29, No 10, p 1174-1176, October, 1957, 2 tab. Presented at the 1957 Annual Meeting, Ohio Sewage and Industrial Wastes Treatment Conference, Dayton, Ohio, June 19 - 21, 1957.

Descriptors: *Anaerobic digestion, *Food processing industry, *Laboratory tests, Biochemical oxygen demand, Carbon dioxide, Sulfides, *Waste water treatment, Ohio.
Identifiers: *Meat packing wastes, *Blood.

Since the sewage treatment plant at Kent, Ohio had only one primary digester, an investigation was made on the anaerobic digestion of blood coming from a nearby slaughterhouse. Two pyrex jugs of 20,000 ml capacity approximated closely the actual conditions in the plant primary digester. During a 24-day period a total of 14,400 ml. of fresh solids was added to each pilot digester. In addition, 715 ml of raw blood was added to pilot digester No. 1. Pilot digester No. 2 served as a control. From the study, it appears that addition blood to an anaerobic digester should be approached with extreme caution. The high percentage of carbon dioxide should be approached with extreme caution. The high percentage of carbon dioxide and hydrogen sulfide content in the evolved gas, the great BOD, the extensive scum and foam conditions, the indescribable odor, and the increased digestion time necessary to reduce the volatile matter in the sludge are all factors that indicate unsatisfactory digestion of whole blood.)(Prodehl-UEPA, Corvallis)
W78-00462

PACKINGHOUSE WASTE TRICKLING FILTER EFFICIENCY FOLLOWING AIR FLOTATION,
Morrell (John) and Co., Ottumwa, IA. Chemical and Research Labs.
K. A. Hirlinger, and C. E. Gross.
Sewage and Industrial Wastes, Vol 29, No 2, p 165-169, February 1957, 4 fig, 2 tab, and ref. Presented at the 1956 annual meeting, Iowa Sewage and Industrial Wastes Assn.; Clear Lake, Iowa; Sept 12 - 14, 1956.

Descriptors: *Flotation, *Food processing industry, *Trickling filters, Biochemical oxygen demand, Design data, Nitrogen, Oil wastes, Sampling, Water analysis, *Waste water treatment, Iowa.
Identifiers: *Meatpacking wastes, Grease.

The objective of this study was to determine the efficiency of a trickling filter in reducing the 5-day BOD of packinghouse waste which had previously been subjected to treatment by air flotation. A 14-foot diameter filter was designed and constructed to obtain data which would be of practical value in determining the size of fullscale units in possible future planning. The filter was designed in accordance with the formula advocated by Eldridge for high-rate trickling filters. Startup and operation, and problems encountered, are discussed. Methods of sampling are presented and results of effluent analysis are tabulated for BOD, COD, nitrogen, and grease. The average reductions in BOD, oxygen consumed, grease, and nitrogen accomplished by all unit employed in this test compare favorably with the reductions given for more conventional combinations of secondary treatment units. (Prodehl-EPA, Corvallis)
W78-00463

COMBINED TREATMENT OF POULTRY AND DOMESTIC WASTES,
Roberts and Co. Associates, Atlanta, GA.
J. M. Roberts.
Sewage and Industrial Wastes, Vol 30, No 9, p 1186-1189, September 1958. Presented at Industrial Waste Conference, Georgia Institute of Technology, Atlanta, GA; April 11, 1958, 1 tab.

Descriptors: *Poultry, *Operating costs, *Municipal wastes, *Waste water treatment, Food processing industry, Screens, Sedimentation, Biological treatment, Sampling, Water analysis, Georgia.
Identifiers: *Poultry processing wastes, Offal, Feathers.

In spite of the apparent profitable means of waste disposal to local rendering plants, a large percentage of poultry waste material finds its way into the sewers. From samples collected, the water used per bird averaged 5.32 gal. in the government inspected plants and only 2.17 ga. in the other plants. The BOD contributed per bird averaged 0.03 lb. By accepting 0.17 lb. BOD per person per day as a

normal sewage contribution, then each six birds processed equals one person. On the basis of 3.26 gal. of water per bird, composition of the waste to be expected from a processing plant per 100 birds is about as follows (in lb. 1,000 birds): 26.6 total solids, 15.3 suspended solids, 9.4 settleable solids, 1.3 grease, and 30.0 BOD5. During the first year of operation of a combined treatment plant grit averaged 10.38 cfd and feathers averaged 20.2 cfd. Screen stations being installed at plant sites consist of 2 types, vibrating or rotary. Operational problems due to feathers, pumping and digestion are discussed. Treatment costs are included. (Prodehl-EPA, Corvallis)
W78-00464

OPERATION OF FULL-SCALE ANAEROBIC CONTACT TREATMENT PLANT FOR MEAT-PACKING WASTES,
Wilson and Co., Inc., Albert Lea, MN. Albert Lea Waste Treatment Plant.
A. J. Steffen, and M. Bedker.
In: Proceedings 16th Industrial Waste Conference, Purdue Univ., Lafayette, Indiana, Engr. Ext. Ser. No 109, May 1961, p 423-437, 13 fig, 2 tab, 7 ref.

Descriptors: *Anaerobic digestion, *Food processing industry, *Oxidation lagoons, Anaerobic conditions, Biochemical oxygen demand, Data collections, Effluent, Feasibility studies, Heat treatment, Sedimentation, Sludge digestion, Suspended solids, Wastewater treatment, Waste identification, Minnesota.
Identifiers: *Meat packing wastes, *Anaerobic contact treatment, *Degassification.

Since December 1959, all of the waste from the Wilson and Company Meat Packing Plant at Albert Lea, Minnesota has been treated by the anaerobic contact process. The design of this treatment plant, the first of its kind, was based upon pilot scale studies conducted initially by Hormel and Company, and later by the American Meat Institute at Austin, Minnesota, and by Wilson and Co. and Albert Lea. The process takes advantage of the fact that anaerobic organisms thrive best on warm (90 to 95F temperature), high organ solids wastes. The treatment plant flow diagram is shown and discussed, the main units being an equalizer, 2 degassifiers, and anaerobic digesters in parallel, 2 sludge separators in series, and 2 oxidation lagoons in series. The anaerobic contact process is similar to the activated sludge process. The effluent is well within the tolerance of 30 ppm BOD and suspended solids, established by the Minnesota Water Pollution Control Commission, and compares favorably with results obtained in aerobic waste treatment process. Complete operating data is tabulated and graphs presented of relative parameters for the digesters and polishing lagoons. (Prodehl-EPA, Corvallis)
W78-00465

POLLUTION ABATEMENT OF POULTRY PROCESSING AND BY-PRODUCTS WASTES,
Rockingham Poultry Marketing Cooperative Inc., Broadway, VA.
E. A. Budd, and S. C. Crawford.
In: Proceedings 16th Industrial Waste Conference, Purdue Univ., Lafayette, Indiana, Engr. Ext. Ser. No 109, May 1961, p 64-66.

Descriptors: *Centrifugation, *Food processing industry, *Water reuse, Biochemical oxygen demand, Cost analysis, Dewatering, Laboratory tests, Oil wastes, Standards, Water analysis, *Waste water treatment.
Identifiers: *Poultry processing wastes.

The Rockingham Poultry Marketing Cooperative have four processing plants that are producing 120,000 chickens and turkeys a day; a 20 million lb. per year dog food plant, and a chicken products canning plant. Water from the operations flow in almost a closed cycle because of centrifugal solids and fatty wastes separation by use of a Sharpes P-200 Super-D-Canter and a Sharpes DG-2 Autojector. Sludge is disposed of manually, and the previously installed sedimentation and lagoon treatment system is only used to collect the sludge prior to disposal. An approximate materials balance of the systems indicates that at a wastes input of 3200 gph about 400 lbs/hr. of solids are removed and 125 lbs./hr. of fat recovered. It is expected that future operation of this system will exceed the criteria set by the Virginia State Water Control Board of 80-85% BOD and suspended solids removal. Operating costs are discussed. (Prodehl-EPA, Corvallis)
W78-00466

OXIDATION POND STUDIES ON EVISCERATION WASTES FROM POULTRY ESTABLISHMENTS,
Delaware State Water Pollution Commission, Dover.
J. S. Anderson, and A. J. Kaplovsky.
In: Proceedings 16th Industrial Waste Conference, Purdue Univ., Lafayette, Indiana, Engr. Ext. Ser. No. 109, May 1961, 9 fig, 1 tab, 14 ref.

Descriptors: *Oxidation lagoons, *Food processing industry, *Lagoons, *Poultry, *Odor, Biochemical oxygen demand, Feasibility studies, Design criteria, Nitrates, Nitrites, Ponds, Stabilization, *Waste water treatment, Delaware.
Identifiers: *Poultry processing wastes, Blood, Viscera.

Presented is an interim report of data collected to date by the Water Pollution Commission, State of Delaware, in its effort to study, primarily, the effectiveness of oxidation ponds to treat a comparatively heavy loading of highly nutrient wastes from a poultry processing plant. Removal of an existing odor problem, and establishing criteria for a more economical design applicable to existing conditions within Delaware were the main purposes of the investigation. Space limitations at the particular installation studies necessitated accepting a design loading far exceeding the conventional surface loadings of 20 to 100 lbs. BOD per acre per day; that being a highly colored blood-type waste at surface loadings as high as 250 lbs. BOD per acre per day. The oxidation ponds consist of a 3.71 acre lagoon and a 4.02 acre lagoon, operated in parallel. A flow diagram of the poultry plant waterborne wastes and graphical data of influent and effluent characteristics vs. time are presented. The average hydraulic loading for both ponds was 1,314,000 gal. per day. Detention time was 2.89 days at 18 inches depth, and 3.85 days at 24 inches depth. Conclusions of the investigation show that total surface loadings of approximately 214 lbs. BOD/acre/day from poultry processing plants, appear feasible in high rate oxidation ponds with potential BOD reductions from 70 to 96%, and effective odor control with less loading during darkness periods. (Prodehl-EPA, Corvallis)
W78-00467

POND TREATMENT OF MEAT PACKING PLANT WASTES,
Swift and Co., Chicago, IL. Operating Div.
F. W. Sollo.
In: Proceedings 15th Industrial Waste Conference, Purdue Univ., Engr. Ext. Ser. No. 106, p 386-391, May 1960. 2 tab, 3 fig, 3 ref.

Descriptors: *Anaerobic digestion, *Food processing industry, *Lagoons, *Oxidation lagoons, *Ponds, Biochemical oxygen demand, Laboratory tests, *Waste water treatment, Water analysis.
Identifiers: *Meat processing industry.

A two-stage system of ponds has been applied to the treatment of meat packing plant wastes. On a pilot scale test an 8,000 gal., five foot deep anaerobic pond produced an average BOD reduction of 78.6% with an influent BOD of 1,680 ppm, pond temperature of 72F, and detention period of 4.4 days. On the same test a 0.53 acre, three feet deep oxidation pond produced a 90% BOD reduction with an influent BOD of 1,450 ppm, detention period of 50 days, and a BOD loading of 243 lbs. per acre per day. The anaerobic pond did not produce a stable effluent but was far more efficient in BOD reduction per unit area. It also appeared that the oxidation pond could handle loadings higher than generally used and produce a stable effluent. Operating data is tabulated for the test ponds in series. A full scale treatment pond system was constructed in 1955. The anaerobic pond is 192 feet X 320 feet at the surface and has a 14 foot water depth. The oxidation pond has a total surface area of 19.2 acres and 3 foot water depth. BOD values for the first four years of operation are tabulated. Advantages are low investment cost, simplicity of operation, and production of effluent that is stable without dilution. (Prodehl-EPA, Corvallis)
W78-00468

PACKINGHOUSE WASTE PROCESSING, APPLIED IMPROVEMENT OF CONVENTIONAL METHODS,
Rath Packing Co., Waterloo, IA.
K. M. Garrison, and R. J. Geppert.
In: Proceedings 15th Industrial Waste Conference, Purdue Univ., Engr. Ser. No 106, May 1960, p 207-218. 6 fig, 7 tab.

Descriptors: *Coagulation, *Costs, *Flotation, *Air entrainment, *Classification, *Filtration, *Centrifugation, Biochemical oxygen demand, Food processing industry, Oil wastes, Recycling, Sedimentation, Suspended solids, *Waste water treatment.
Identifiers: *Meat packing wastes, Grease removal.

A study was made of various types of waste handling equipment in an effort to recover valuable materials and reduce the strength and volume of packinghouse wastes. The processes studied included air-flotation, liquid-solid cyclone classification, vacuum-drum filtration, and centrifugation. It was found that each process could be applied for reducing the biological load and solids content of packinghouse wastes. However, for the plant under study, the high capital investment and operating costs or low rates of material recovery precluded their application. The most effective methods for reducing valuable material losses were determined by a thorough study of each plant waste process. Modification of the methods of handling hasher wash waters and interceptor bottom sludge resulted in increased grease and tankage recovery as well as reduced hydraulic and biological load of the plant sewage. The use of plastic as a filter media in a biological filter tower resulted in BOD removals of 70% at very high rates of filter loading. (Prodehl-EPA, Corvallis)
W78-00469

DEVELOPMENT OF THE ANAEROBIC CONTACT PROCESS. II. ANCILLARY INVESTIGATIONS AND SPECIFIC EXPERIMENTS,
Minnesota Univ., Minneapolis. Dept. of Sanitary Engineering.
G. J. Schroepfer, and N. R. Ziemke.
Sewage and Industrial Wastes, Vol 31, No 6, June 1959. 13 fig, 3 tab, 1 ref.

Descriptors: *Anaerobic digestion, *Flotation, *Sedimentation, *Adsorption, *Stabilization, *Centrifugation, Biochemical oxygen demand, Activated sludge, Food processing industry, Heat, Laboratory tests, Organic loading, Sludge treatment, Wastewater treatment, Minnesota.
Identifiers: *Meat packing wastes, *Anaerobic contact.

This is the second of a two-part paper summarizing the results of three years of research on the application of the anaerobic contact process in the treatment of various types of industrial wastes and

municipal sewage. Synthetic milk wastes and meat packing wastes were the main wastes tested. (Part I included data from pilot-plant investigations and an economic analysis and was published by the same Journal, Vol. 31. No. 2, p 164, February 1959.) Part II reports on ancillary investigations and special experiments, summarizes the study, and offers the conclusions. Included in these investigations were: (1) A series of experiments run on a batch basis to determine the adsorption and stabilization characteristics of anaerobic sludge and, (2) pilot plant studies to evaluate the factors influencing separation and concentration of active sludges including gravity separation, air flotation, centrifuging, and wicketing. (Prodehl-EPA, Corvallis)
W78-00470

STABILIZATION PONDS FOR MEAT PACKING WASTES,
Wilson and Co., Inc., Chicago, IL.
A. J. Steffen.
Journal Water Pollution Control Federation, Vol 35, No 4, p 440-444, April 1963. 3 fig, 1 tab, 7 ref.

Descriptors: *Aerobic treatment, *Anaerobic digestion, *Lagoons, *Ponds, *Stabilization, Biochemical oxygen demand, Food processing industry, Organic wastes, Temperature, Wastewater treatment.
Identifiers: *Meat packing wastes, Aerobic lagoons, Anaerobic lagoons.

The development and uses of stabilization ponds in the meat packing industry are discussed, the main uses being as tertiary treatment following conventional aerobic systems or an aerobic contact system; as secondary treatment, either two stage anaerobic - aerobic systems or single-stage aerobic basins; or as complete treatment following conventional grease recovery. Examples of stabilization lagoons operated under these various conditions at different plants are discussed, and operating data and BOD efficiencies are tabulated. Conclusions derived from experience in the use of stabilization basins for treatment of meat packing wastes include: (1) complete treatment can be accomplished by anaerobic basins 8 to 17 feet deep loaded at 0.011 to 0.015 lb. BOD/day/cu. ft. followed by conventional aerobic lagoons loaded at 50 to 280 lb. BOD/day/acre, or (2) by aerobic lagoons limited to lower BOD loadings in the range of 50 lb/day/acre; (3) secondary treatment permitting loading in excess of 200 lb./day/acre with 90 percent removal can be accomplished following equalization and clarification; and (4) tertiary treatment utilizing aerobic lagoons will successfully treat an anaerobic effluent of 130 BOD mg/l at an average loading of 410 lb./day/acre and yield an aerobic effluent of less than 30 mg/l BOD. (Prodehl-EPA, Corvallis)
W78-00471

ANAEROBIC AND AEROBIC PONDS FOR PACKINGHOUSE WASTE TREATMENT IN LOUISIANA,
Louisiana State Board of Health, New Orleans. Div. of Public Health Engineering.
J. F. Coerver.
Proceedings 19th Industrial Waste Conference, Purdue Univ., Ext. Ser. 117, p 200-209, May 1964. 3 fig, 5 tab.

Descriptors: *Aerobic treatment, *Anaerobic digestion, *Lagoons, *Ponds, *Stabilization, Biochemical oxygen demand, Food processing industry, Odor, Organic loading, Sedimentation, *Waste water treatment, *Louisiana.
Identifiers: *Meat packing wastes, Anaerobic lagoons, Aerobic lagoons.

The results of treating packinghouse wastes in a pond system at Houma, Louisiana, and comparatively designed installations at Slidell and Gonzales, Louisiana, indicate that packinghouse wastes, including blood and paunch manure, can be successfully treated in low cost ponds without significant nuisance or health hazard. These pond systems, and other similar installations recently placed in operation in the State of Louisiana, consist of three ponds in series - an anaerobic pond, a 'transitional' pond, and an aerobic pond. The first such pond installation in the state, at Autin Packing Company in Houma, has been removing 98.1 percent of the BOD applied to the pond system. Most of the BOD is removed in the anaerobic pond where 879 lbs./acre/day have been removed in a pond only two feet deep with an applied loading of 950 lbs./acre. It has been demonstrated that equivalent BOD removals/acre-ft of volume in the anaerobic pond could be achieved in deeper ponds. Consistantly good results obtained at mature pond installations at Gonzales and Slidell bear this out. To date, these pond systems have given very satisfactory results. They are by far the least expensive treatment units to build and operate, are reliable, and are nuisance free except for slight odors at initial operation. (Prodehl-EPA, Corvallis)
W78-00473

FUNDAMENTAL PRINCIPLES OF SEWAGE CHLORINATION,
Public Health Service, Cincinnati, OH. Div. of Water Supply and Pollution Control.
C. E. Rhines.
In: Proceedings 20th Industrial Waste Conference, Purdue Univ., Eng. Ext. Ser. No 118, p 673-678, May 1965. 3 tab, 3 ref.

Descriptors: *Chlorination, *Disinfection, *Nitrites, Biological treatment, Food processing industry, Laboratory tests, Nitrates, Oxidation, *Sewage treatment, *Waste water treatment.

Sewage usually contains many substances that limit the activity of chlorine, and chlorine treatment has been found to be of little or no benefit in many treatment plant operations. The Microbiology Section, Basic and Applied Sciences Branch, Division of Water Supply and Pollution Control, initiated a study to learn the means of achieving reliable disinfection. Experiments were conducted to determine the main factors affecting chlorination. Conclusions include: (1) amino acids completely stop the disinfection process whereas ammonia merely slows the process; (2) the chlorine demand of domestic sewage was commonly reduced by a factor of three after 5 to 20 hrs. of slow aeration; (3) chlorination of septic sewage requires excessive chlorine; and (4) the major hindrances to reliable sewage chlorination are nitrate compounds, parasites in dumped sewage, and oxidation of reducing substances. Tests bear out the fact that superficial bio-oxidation, as commonly practiced, is worthless before chlorination and often causes serious interference through intermediate oxidation products, notably, nitrite nitrogen. (Prodehl-EPA, Corvallis)
W78-00474

POLYELECTROLYTES IN INDUSTRIAL WASTE TREATMENT,
Dow Chemical U.S.A., Midland, MI.
R. B. Schaffer.
In: Proceedings 18th Industrial Waste Conference, Purdue Univ., Engr. Ext. Ser. No. 115, p 447-459, May 1963. 8 fig, 4 tab.

Descriptors: *Coagulation, *Flocculation, *Food processing industry, *Sedimentation, Anaerobic digestion, Aerobic treatment, Biochemical oxygen demand, Laboratory tests, Sludge digestion, *Waste water treatment.
Identifiers: *Meat packing wastes, *Polyelectrolytes.

Factors such as pH, ionic charge, temperature, solids concentration and many others make it virtually impossible for one particular chemical to apply in each instance in solids-liquid separation. Because of these variations, the PURIFLOC flocculants were developed by the Dow Chemical Company for use as synthetic organic polyelectrolytes in waste treatment processes. Case studies of various industries using this product are presented and data tabulated showing definite improvements over their conventional methods. Laboratory and pilot studies using polymers for the operational improvement of an anaerobic contact process used by Wilson and Company in Albert Lea, Minnesota, were encouraging enough to warrant a full-scale trial. Data is presented for varying dosages of polymer and digester loadings. In every instance, the percentage of BOD removed and settling rates increased in the sludge separators after addition of the polymer. (Prodehl-EPA, Corvallis)
W78-00475

INDUSTRIAL WASTE STABILIZATION PONDS IN CANADA,
Ontario Water Resources Commission, Toronto.
F. A. Voege, and D. R. Stanley.
Journal Water Pollution Control Federation, Vol 35, No 8, August 1963, p 1019-1023.

Descriptors: *Food processing industry, *Lagoons, *Ponds, *Stabilization, Biochemical oxygen demand, Industrial wastes, *Waste water treatment, *Canada.
Identifiers: *Meat packing wastes, *Poultry processing wastes, *Rendering wastes.

A survey was conducted of the application of stabilization ponds for the treatment of industrial wastes in Canada. The meat packing, poultry processing and rendering industries are included. Meat packing plants and slaughterhouses with low volume discharges are using smaller areas than the Ontario Water Resources Commission design criteria of 20lb. BOD/acre/day, yielding anaerobic conditions, but are located mostly in isolated areas. A number of poultry processing plants in Ontario and Manitoba use oxidation basins with a BOD loading range of 20 upwards to 135 lb./day/acre, the upper loadings yielding very septic conditions and offensive odors. One rendering plant in Ontario uses this method of waste treatment with an average loading of 44 lb. BOD/day/acre and a removal efficiency of 95%. (Prodehl-EPA, Corvallis)
W78-00477

ANAEROBIC STABILIZATION POND TREATMENT OF MEAT PACKING WASTES,
South Dakota State Univ., Brooking. Dept. of Civil Engineering.
D. W. Rollag, and J. N. Dornbush.
In: Proceedings 21st Industrial Waste Conference, Purdue Univ., Engr. Ext. Series No 121 Pt. 2, p 768-782, May 1966. 5 fig, 5 tab, 20 ref.

Descriptors: *Stabilization, *Anaerobic digestion, *Aerobic treatment, *Food processing industry, *Lagoons, *Ponds, Costs, Design criteria, Laboratory tests, Biochemical oxygen demand, *Waste water treatment, Water analysis, Minnesota.
Identifiers: *Meat packing wastes, *Anaerobic lagoons.

An investigation was conducted on anaerobic - aerobic stabilization pond system treating the wastewater from the Minnesota-Iowa-Dakota (MID) Packing Co., Luverne, Minnesota, where approximately 400 beeves per day are killed and dressed. The organic, hydraulic and temperature characteristics of the wastewater were studied at various locations along its flow-path through the treatment system. The primary objective of the study was to evaluate the design and performance of this treatment system during winter operation, studies being conducted in February and early March. Design criteria and construction of the treatment system are discussed. Operational data for the test period is tabulated and discussed. Conclusions of the study show that the treatment system as investigated appears to be an efficient

and economical slaughterhouse waste treatment method, at an initial cost of about $7.00 per BOD population equivalent and 95% overall removal efficiency. (Prodehl-EPA, Corvallis)
W78-00478

DESIGN AND PERFORMANCE EVALUATION OF AN ANAEROBIC STABILIZATION POND SYSTEM FOR MEAT-PROCESSING WASTES,
South Dakota State Univ., Brookings. Dept. of Civil Engineering.
D. A. Rollag, and J. N. Dornbush.
Journal Water Pollution Control Federation, Vol 38, No 11, November 1966, p 1805-1812. 5 fig, 2 tab.

Descriptors: *Anaerobic digestion, *Aerobic treatment, *Food processing industry, *Stabilization, *Lagoons, *Ponds, Costs, Design criteria, Biochemical oxygen demand, *Waste water treatment, Water analysis, Minnesota.
Identifiers: *Meat packing wastes, *Anaerobic lagoons.

Description of the treatment system, design criteria, and start-up of the anaerobic - aerobic stabilization pond system at the Minnesota-Iowa-Dakota (MID) Packing Co., Luverne, Minnesota, is presented. Performance data, as analyzed by the Minnesota Department of Health Personnel, is discussed, the organic hydraulic and temperature characteristics of the wastewater being studied at various locations along its flow-path through the treatment system. The anaerobic-aerobic pond system at the MID Packing Co. has proved to be an efficient and economical slaughterhouse waste treatment method at an initial cost of about $7.00/BOD population equivalent and 95% overall removal efficiency. (Prodehl-EPA, Corvallis)
W78-00479

DESIGN CONSIDERATIONS FOR ANAEROBIC CONTACT SYSTEMS,
Clark, Dietz, and Associates, Urbana, IL.
J. C. Dietz, P. W. Clinebeil, and A. L. Strub.
Journal Water Pollution Control Federation, Vol. 38, No. 4, April 1966, p. 517-530, 10 fig, 3 tab, 10 ref.

Descriptors: *Anaerobic digestion, *Food processing industry, *Lagoons, *Ponds, Biochemical oxygen demand, Cost comparisons, Design criteria, Oil wastes, *Waste water treatment.
Identifiers: *Meat packing wastes, *Anaerobic contact, Grease.

Design considerations are presented for both the anaerobic contact process and anaerobic lagoons. Results of a pilot lagoon study at the Union City, Tenn., Municipal Wastewater Treatment Plant include data derived from temperature, BOD loading, grease, and suspended solids variable rates. The data demonstrates the ability of the anaerobic lagoon to absorb wide fluctuations in influent strength and the ability to assimilate grease quite readily. BOD removals in the pilot lagoon consistantly remained above 80% and exceeded 90% as the temperature increased above 80F. Specific design considerations for the anaerobic contact process and for anaerobic lagoons are individually discussed, including reference to application of meat processing wastes. (Prodehl - EPA, Corvallis)
W78-00480

THE ECONOMICS OF POOR HOUSEKEEPING IN THE MEAT-PACKING INDUSTRY,
Hormel (George A.), and Co., Chicago, IL.
W. J. Fullen, and K. V. Hill.
Journal Water Pollution Control Federation, Vol. 39, No. 4, April 1967, p. 659 - 664, 2 tab, 4 ref.

Descriptors: *Biochemical oxygen demand, *Cost comparisons, *Food processing industry, *Nitrogen compounds, *Oil wastes, Chlorides, Industrial wastes, Waste water treatment, Water pollution sources.
Identifiers: *Meat packing wastes, *In-plant control, Protein, Grease.

The purpose is to point out the potential values of the nitrogen and fat in a packer's waste and to relate them to BOD in the waste, and hence, the size of the necessary treatment plants. The method of calculating the potential value of the grease and nitrogen is presented. Losses of BOD and nitrogen from various plants are tabulated. Costs of waste treatment due to poor housekeeping techniques are given and examples presented. The ratio of concentration of nitrogen to 5-day BOD indicated that proteins contribute substantially to the total BOD load. (Prodehl-EPA, Corvallis)
W78-00481

SPRAY IRRIGATION OF WASTES FROM THE MANUFACTURE OF HARDBOARD,
Masonite Corp., Chicago, IL.
For primary bibliographic entry see Field 5E.
W78-00483

EQUALIZATION OF LIQUID WASTES,
New Jersey Inst. of Tech., Newark. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5B.
W78-00484

SEPARATION OF SOLIDS IN THE ANAEROBIC CONTACT PROCESS,
Wilson and Co., Inc., Chicago, IL.
A. J. Steffen, and M. Bedker.
Public Works, Vol. 91, No. 7, July 1960, p. 100 - 102, 2 fig, 5 ref.

Descriptors: *Anaerobic digestion, *Flotation, *Food processing industry, *Aeration, *Sedimentation, Biochemical oxygen demand, Cost comparisons, *Waste water treatment, Minnesota, *Separation techniques.
Identifiers: *Meat packing wastes, Anaerobic contact.

Solids separation in the anaerobic contact process at the Wilson and Company, Inc. meat packing plant was one of the principal research problems encountered. To permit separation of the solids from the mixed liquor by gravity, a 20-inch vacuum is drawn on the entire effluent from the digesters to remove residual gases. The gassified liquor is then discharged into a sedimentation tank (separator). Although vacuum degassification was successful in removing solids from the mixed liquor, alternative sludge removal methods were tried. Tests of vacuum degassification with series operation of the separators rather than parallel showed secondary gas generation and no improvement in sludge concentration. Laboratory and pilot scale tests with degassification by the aeration process indicated that methane and excess carbon dioxide gases are successfully removed yielding superior effluent, but produced odor and was found less economical. A tested air flotation unit yielded a consistently higher quality effluent to a very definite break point in solids loading of 88 lbs./sq.ft./day. From the studies it was concluded that vacuum degassification is the most economical and practical method, however, direct aeration and air flotation present possibilities under less stringent effluent quality requirements. (Prodehl - EPA, Corvallis)
W78-00488

PACKING WASTES TREATED AUTOMATICALLY,
Kahn's (E.) Sons, Inc., Cincinnati, OH.
E. G. Anderson.
Public Works, Vol 86, November 1955, p 103 - 104, 2 fig.

Descriptors: *Chemical precipitation, *Coagulation, *Flotation, *Food processing industry, *Oil wastes, *Automatic control, Biochemical oxygen demand, Costs, Suspended solids, *Waste water treatment, Ohio.
Identifiers: *Meat packing wastes.

Because of a high production of approximately 1,000 cattle and 6,000 hogs per week at the E. Kahn's Sons, Inc. meat packing plant and average waste flow of 500,000 gal./day, a high percentage of fats, grease and oil was discharged to the city sewers resulting in high charges based on loading. BOD contents of the waste ranged 2,000 - 2,500 ppm and suspended solids 1,200 - 1,400 ppm. A Coldoidair unit, made by Bulkley, Dunton Processes, Inc., was installed. The systems operating principle, as discussed, is chemical flocculation, followed by dissolved air flotation, followed by mechanical skimming of floated solids. The unit is fully automatic. The effluent discharges at 800 - 900 ppm. BOD and 500 - 600 ppm. suspended solids, and the sludge is blended for rendering. Fifteen thousand dollars/year are saved on sewerage charges and about 10.000 lb. of valuable fats, tallow and protein solids are recovered each week. (Prodehl - EPA, Corvallis)
W78-00489

PUBLIC HEALTH SERVICE GUIDE TELLS HOW TO TREAT MEAT WASTES BY FILTRATION WITH SEWAGE.
Wastes Engineering, February 1956, p 76 - 86, 1 tab.

Descriptors: *Food processing industry, *Trickling filters, *Waste water treatment, *Sewage, Aerobic treatment, Biochemical oxygen demand, Biological treatment, Chemical precipitation, Activated sludge.
Identifiers: *Meat packing wastes.

Since meat wastes are amenable to biological treatment in plants of the type in common use for treatment of domestic sewage, the most satisfactory method is to treat them in conjunction with domestic sewage. Examples of cities using such treatment methods are given. Methods of treatment and results are discussed on the extensive studies of treatment for meat packing wastes by the District of Chicago through the operation of the Packingtown testing station in 1912 - 1918. Description and results of packing plants using double filtration, high rate filtration, and chemical precipitation are presented. (Prodehl - EPA, Corvallis)
W78-00490

TREATING MEAT PROCESSING WASTES,
Wilson and Co., Inc., Chicago, IL.
A. J. Steffen.
Public Works, Vol 87, p 167 - 170, August 1956. 6 ref.

Descriptors: *Activated sludge, *Anaerobic digestion, *Chemical precipitation, *Flotation, *Filters, *Food processing industry, *Irrigation systems, *Septic tanks, *Sedimentation, *Trickling filters, Biochemical oxygen demand, Cost comparisons, Screens, Oil wastes, *Waste water treatment.
Identifiers: *Meat packing wastes.

Various treatment process methods available to the small slaughterhouse operator are discussed. In-plant waste prevention and handling, screening, and grease recovery as preliminary waste reduction measures to waste treatment, are discussed. Evaluations of the following waste treatment methods are presented: (1) solids removal by sedimentation and dissolved air flotation yielding a minimum BOD removal of 25 - 40%; (2) septic tanks, at 70 - 90% BOD reduction; (3) intermittent sand filters yielding BOD reductions of approximately 95% in the summer and 85% in the winter; (4) trickling filters with BOD removals in excess of

95%; (5) chemical treatment using chlorine, alum, ferric salts and lime yielding reductions of approximately 60 - 95% BOD depending on amount of process cooking; (6) anaerobic digestion with loading rates of 4 times that of conventional aerobic proceses; and (7) treatment and disposal by irrigation. (Prodehl - EPA, Corvallis)
W78-00491

RUPTURED DIGESTER COVER DUE TO PACKINGHOUSE WASTES,
V. A. Vaseen.
Wastes Engineering, Vol 24, July 1954, p 316-317, 3 draw, 3 fig.

Descriptors: *Anaerobic digestion, *Digestion tanks, *Food processing industry, Design data, Hydraulic equipment, *Waste water treatment.

Cracking of an anerobic digester cover at the Clear Creek Valley Water and Sanitation District Sewage Treatment plant occurred because of manure and stockyard cleanup material washed down the municipal drains. The exceedingly thick scum blanket of manure, hair, straw and other materials in the digester increased to a depth where it extended over the entry of the automatic overflow - antisiphon mechanism, clogging it, and causing excessive pressures from generated gases and continuous inflow from the sludge pump. Detailed sketches are shown of a 2-foot-square by approximately 2-foot-high metal pressure relief hatch which is to set in an oil seal in the repaired cover, acting as a pressure failure unit. (Prodehl - EPA, Corvallis)
W78-00492

ODOR CONTROL BY CHEMICAL OXIDATION,
Woodward-Envicon, Inc., Phoenix, AZ.
C. Suydam.
Plant Engineering, Sept 12, 1974, p 81 - 83. 3 fig, 2 tab.

Descriptors: *Oxidation, Odor, *Food processing industry, *Chemical reactions, Design criteria, Incineration, Cost comparisons, Waste treatment.
Identifiers: *Chemical oxidation, *Odor control.

Chemical oxidation - if used properly - is an effective odor control method. Cost comparisons and physical and chemical comparisons of chemical oxidation to incineration are analyzed. Parameters are presented on odorant properties, oxidant properties, and equipment design considerations on which to conduct a study to obtain the relations between removal efficiencies and the critical design parameters. Discussions of oxidation kinetics, oxidation products, solubility and stability and storage properties are included. (Prodehl - EPA, Corvallis)
W78-00493

LAND TREATMENT OF FOOD PROCESSING WASTEWATER,
Campbell Soup Co., Camden, NJ.
L. C. Gilde.
American Society of Civil Engineers, Vol. 99, Mo. IR3, p 339-352. September 1973. 9 fig, 3 tab, 3 ref.

Descriptors: *Food processing industry, *Irrigation systems, *Land use, Biochemical oxygen demand, Design data, Environmental effects, Flow rates, Hydraulic design, Nitrogen, Phosphorous, *Waste water treatment.
Identifiers: *Poultry processing wastes.

Two methods of spray irrigation land treatment were examined and utilized for wastewater treatment, conventional infiltration type irrigation being used for poultry processing wastes and overland flow spray irrigation being used for vegetable canning wastes. Ground treated water is retreived by buried drain tile to a polishing lagoon in the first case and surface treated water drained to a receiving stream in the second case. Analysis of the reed canary grass used in both cases has shown the mineral content to be higher than normal, concentrations of nitrogen-crude protein ranging up to 23% and phosphorous to be nearly double its normal value. Approximately 98% BOD removal efficiencies were found in both treatment sites, both having high buffering capacities. (Prodehl - EPA, Corvallis)
W78-00494

5E. Ultimate Disposal Of Wastes

AMINO ACID COMPOSITION OF DRIED CITRUS SLUDGE AND ITS POTENTIAL AS A POULTRY FEEDSTUFF,
Agricultural Research Service, Winter Haven, FL. Citrus and Subtropical Products Lab.
For primary bibliographic entry see Field 5B.
W78-00018

USING FOOD-PROCESSING WASTEWATER FOR IRRIGATION,
California Univ., Parlier. Cooperative Extension.
J. L. Meyer.
California Agriculture, Vol. 31, No. 5, p 38, May, 1977.

Descriptors: *Return flow, *Irrigation practices, *Canneries, *California, *Nutrient removal, Industrial wastes, Food processing industry, Soil-water-plant relationships, Salts, Biochemical oxygen demand, Water quality management(Applied), Waste water treatment, Effluents, Waste water disposal.

Food processing waste disposal practices in California are described. Plants in the Central Valley of California produce 2-4 mgd of effluent which could be used to irrigate 400-800 acres of cropland at the site of each processing plant. Constituents in food processing waste waters which may require treatment include added nutrients such as nitrogen and phosphorus, added salts which contribute to salinity and the total dissolved solids, and fruit sugar which results in biochemical oxygen demand. These problems may be minimized by the use of plants to reduce nutrient levels; the addition of calcium to reduce the effects of sodium in salt; and the reduction of effects associated with BOD, such as odor and anaerobic soil conditions, by shallow irrigation and cultivation within 3-4 days after the effluent is applied. Effective water quality monitoring, management, and irrigation practices are suggested as important in the reuse of waste water for irrigation. Waste water irrigation has been successfully employed with a variety of crops, including pasture grasses, alfalfa, sorghum, barley, oats, and grapes. (Schulz-FIRL)
W78-00026

SURVEYING MASSACHUSETTS' HAZARDOUS WASTES,
GCA Corp., Bedford, MA.
P. F. Fennelly, M. A. Chillingworth, P. D. Spawn, M. I. Bornstein, and H. I. Bonne.
Environmental Science and Technology, Vol 11, No 8, p 762-766, August, 1977. 2 fig, 4 tab, 1 ref.

Descriptors: *Surveys, *Industrial wastes, *Massachusetts, *Waste disposal, *On-site data collections, Equipment, Oil wastes, Sludge disposal, Chemical wastes, Solvents, Metals, Waste water disposal.

An inventory of hazardous wastes was conducted by the Massachusetts Division of Water Pollution Control to estimate the quantities of hazardous wastes generated according to category and geographic distribution, to identify disposal and recycling options, and to recommend disposal options on an immediate (3 mo-1 yr) and long-term (1-5 yr) basis. State files of annual permit applications and monthly reports from waste haulers licensed and operating in Massachusetts were reviewed. A telephone survey of businesses and industries was conducted to determine the amount, geographic distribution, and current disposal practices for hazardous wastes generated in the state. Waste was categorized by county and type of waste, including oil, solvent, metal sludge plating, miscellaneous sludge, acid and alkali, auto waste oil, and other hazardous waste. Survey results are compared to the state permit data. Recommendations for immediate action on waste disposal include: consolidation of authority for a hazardous waste program, modification of several existing landfills to accept hazardous wastes, stricter enforcement of waste disposal regulations, the use of transfer stations, more efficient waste-oil disposal practices, and the development of public relations and educational programs. (Schulz-FIRL)
W78-00059

STUDY EXAMINES WASTE DISPOSAL AT PITTSBURGH PLANTS,
Westinghouse Research Labs., Pittsburgh, PA.
W. G. Vaux.
Industrial Wastes, Vol 23, No 4, p 36-39, July/August, 1977. 2 fig, 5 tab.

Descriptors: *Resources development, *Waste disposal, *Ultimate disposal, *Mathematical models, *Costs, Energy, Oil wastes, Solvents, Solid wastes, Incineration, Cost comparisons, Fuels, Chemical wastes, Industrials, Waste water disposal, Landfills, Economic feasibility.
Identifiers: Waste disposal costs, Resource recovery.

Results of an evaluation of waste disposal practices by the Westinghouse Corporation for its southwestern Pennsylvania plants are presented. The first phase study which examined parameters, procedures, and costs of waste disposal indicated that costs and methods of waste disposal among Westinghouse sites were highly variable. The potential for resource recovery in waste disposal was investigated in the second phase of the study. The third phase of the study attempted to minimize the overall, net disposal cost for plants in the region and produce a flexible disposal system for changes in waste amounts. A mathematical model for comparing waste disposal alternatives is presented. Descriptions and costs for on-site and centralized means of disposal are presented. Conclusions which are based on the particular geographic area and waste amounts are presented. On-site disposal and mixing of waste solvents with boiler fuel is the recommended method for solvents disposal. Fullers earth reclamation at two central sites or on-site mixing with boiler fuel is the suggested means of lube oil disposal. On-site reclamation of insulating oil and landfilling of cutting fluid are recommended. Steam generation with waste solids at two sites is the suggested means of disposal for plastic, wood, and rubbish. The sale of waste paper products to private processors is suggested. Distillation of chlorinated solvents for reuse is recommended. (Schulz-FIRL)
W78-00060

AGRICULTURAL USE OF SEWAGE SLUDGE: PROBLEMS OF INDUSTRIAL EFFLUENTS (LANDWIRTSCHAFTLICHE VERWERTUNG VON KLAERSCHLAMM: PROBLEME DURCH INDUSTRIEABWAESSER),
Eidgenoessische Forschungsanstalt fuer Agrikulturchemie und Umwelthygiene, Bern (Switzerland).
O. J. Furrer.
Textilveredelung, Vol 12, No 6, p 244-247, 1977. 7 fig, 4 tab, 7 ref.

Descriptors: *Fertilizers, *Nutrient removal, *Heavy metals, *Sewage bacteria, *Pesticides, Industrial wastes, Municipal wastes, Nitrogen, Phosphorus, Sludge disposal, Organic wastes,

Soil-water-plant relationships, Salmonella, Waste water treatment, *Waste water disposal.

Biochemical characteristics of sewage sludge from municipal waste water are described, and the problems caused by industrial waste waters in connection with the agricultural use of sewage sludge are discussed. Sewage sludge analyses at a waste water treatment plant in Switzerland revealed a total nitrogen content of 46 g/kg of dry matter, 15 g/kg ammonium nitrogen, 23 g/kg phosphorus, 3.1 g/kg potassium, 82 g/kg calcium, and 6.8 g/kg. Consequently, sewage sludge can be regarded as a phosphate fertilizer. Agricultural use of sewage sludge requires thorough stabilization for odor control, the destruction of pathogenic germs such as Salmonella, and the absence of high concentrations of heavy metals and pesticides. Sewage sludge from domestic waste water usually contains heavy metals in favorable, physiologically necessary concentrations, while industrial effluents may render sewage sludge unfit for use on farmlands because heavy metals and stable organic compounds tend to accumulate in the soil and inhibit the growth of soil microorganisms. (Takacs-FIRL)
W78-00067

PHOSPHATE REMOVAL BY SANDS AND SOILS,
New York State Dept. of Environmental Conservation, Albany. Research Unit.
For primary bibliographic entry see Field 5D.
W78-00092

AGRONOMIC EFFECTS OF THE LAND DISPOSAL OF WASTES FROM THE AGRICULTURAL AND FOOD INDUSTRIES,
Institut National de la Recherche Agronomique, Versailles (France). Station Centrale d'Agronomie.
A. Morisot, and R. Gras.
Report BTR-76-12, (1976), 39 p. Translated from Annales Agronomiques, Vol. 25, No. 2-3, 1974, p. 243 - 266. 6 fig, 14 tab, 3 ref.

Descriptors: *Agriculture, *Infiltration, *Land use, *Food processing wastes, *Phosphorous, *Ultimate disposal, Biological treatment, Crops, Industrial wastes, Rural areas, Self-purification, Waste disposal, Wastewater treatment.
Identifiers: *Meat packing wastes, *Soil effects, *Vegetation effects, Soil analysis, Slaughterhouse.

This survey, carried out in 1972, on 32 factories of the agricultural industry permitted the agronomic effects of land disposal of process water to be specified. Particular attention was given to marking the evolution of the physical and chemical properties of the soils, which permitted cases of overfertilization to be observed; and particular emphasis was given to the importance of interactions between the nature of the soil to which it was applied in the evolution of the physical properties of the soil. The effects of these applications on the farms which used them are also described. (Prodehl - EPA, Corvallis)
W78-00102

SCREW PRESS DEWATERING SOLVES COSTLY WASTE DISPOSAL PROBLEM,
Cross Bros. Meat Packers, Inc., Philadelphia, PA.
For primary bibliographic entry see Field 5D.
W78-00105

COMPOSTING PAUNCH MANURE,
King and Co. Indianapolis, IN.
V. R. Rupp.
In: Proceedings of the 6th Industrial Waste Conference, Feb 1951, Purdue University, Lafayette, Indiana, p. 363-366, 1 fig.

Descriptors: *Food processing industry, *Land use, *Waste disposal, *Ultimate disposal, *Decomposing organic matter, Heat, Lime, Sewage treatment, Self-purification, Soils, Temperature aerobic treatment, Industrial wastes, Waste treatment.
Identifiers: *Meat packing wastes, *Soil fertilizer, Packinghouse, Beef processing, *Composting.

Properly drained paunch manure is well suited for compost making since it is light, packs loosely, and readily admits air to the pile, and since animal manure contributes microbiological life necessary for digestion. A method of composting paunch material is discussed where a two-foot deep and five foot wide trench is dug and filled with layers of paunch manure, loam and ground limestone, and pen manure. The heap is turned at prescribed interval and kept moist. The typical temperature variation in the heap is graphed. In 11 weeks the finished compost is friable, black in color, containing a faint earthy odor. Paunch weed seeds are destroyed by the prolonged heating. Slow digestion of the compost in the winter and high labor costs are the problems with this method of disposal. (Prodehl - EPA, Corvallis)
W78-00106

FATE OF ANIMAL VIRUSES IN EFFLUENT FROM LIQUID FARM WASTES,
Guelph Univ. (Ontario). Dept. of Veterinary Microbiology and Immunology.
For primary bibliographic entry see Field 5B.
W78-00116

WASTE DISPOSAL IN BEEF FEEDLOTS,
New Zealand Agricultural Engineering Inst., Lincoln.
For primary bibliographic entry see Field 5G.
W78-00117

LIVESTOCK WASTE MANAGEMENT - STATE OF THE ART,
Agricultural Research Service, Lincoln, NE.
For primary bibliographic entry see Field 5G.
W78-00118

WASTE HANDLING AND DISPOSAL GUIDELINES FOR INDIANA DAIRYMEN.
Purdue Univ., Lafayette, IN. Animal Waste Committee.
Publication Number ID-81, 1972. Cooperative Extension Service, Purdue University. 12 p. 3 fig, 3 tab.

Descriptors: *Waste disposal, *Indiana, Legal aspects, *Dairy industry, Regulation, *Waste disposal, Design, Solid wastes, Liquid wastes, Waste storage, Land disposal, *Farm wastes, Water pollution, Agricultural runoff, Rates of application.
Identifiers: *Waste management, Pasture system, Drylot system, Covered system, Odor control.

The purpose is: (1) to acquaint the Indiana dairy farmer with present pollution laws and regulations that most directly affect him, and (2) to present waste handling and disposal guidelines that will help the dairyman determine how nearly he complies with these laws and regulations or how he might develop a system that will comply. The Indiana Stream Pollution Control Board and the Indiana Air Pollution Control Board have the authority to adopt and enforce rules and regulations concerning their respective types of pollution problems. Indiana's Confined Feeding Control Law supplements the Indiana Stream Pollution Control Law in attempting to prevent water pollution. It is now against the law for anyone to start building a confined feedlot operation without approval by the Stream Pollution Control Board. The kind of waste handling system a dairyman should have, facilities needed, their capacities and design, and types of management practices depend, to a large extent, on the number of animals and how they are handled. Systems for handling dairy cattle usually fall into three broad categories – pasture, drylot, and covered systems. Each of these is described and recommended grazing and housing intensities are given. Guidelines are given for design and management. Either solid manure handling systems, liquid manure handling systms, or partial treatment manure handling systems may be utilized in handling and storing wastes. Design recommendations are given for the various management methods utilized in each of these systems. Most dairy wastes are still disposed of on the land. Factors affecting land application rates, how acceptable land application rates may be determined, and precautions that should be taken when returning manure to the land are discussed. Suggestions for minimizing odor problems during disposal are given. (Rowe-East Central)
W78-00119

WASTEWATER RESEARCH EXPANDS,
C. Woods.
Sunshine State Agricultural Research Report, Vol. 17, No. 5-6, p 3-5, Nov.-Dec., 1972. 3 fig.

Descriptors: *Municipal wastes, Sewage, Forages, Crop response, Sprinkler irrigation, Sampling, Chemical properties, Biological properties, Groundwater, Water pollution, Waste disposal, *Recycling.
Identifiers: Land disposal.

A grant from the U.S. Environmental Protection Agency was awarded to the Institute of Food and Agricultural Sciences, Florida to test a new method of recycling municipal sewage water onto farmland. A major goal of the research is to demonstrate the feasibility of discharging about 2-1/2 million gallons of effluent from the Tallahassee Southwest Wastewater Treatment Plant over farmland through a sprinkler-irrigation system. The research is also attempting to determine the response of forage crops (oats, rye, ryegrass, sorghum, kenaf, corn, millet and coastal bermudagrass) to various application rates and frequencies--ranging from 1 to 8 inches/week. Plant and soil samples will be collected from each test plot for analysis. Plant responses to nutrients in wastewater, efficiency of removal, and forage quality for animal feed will be checked. Wells will be installed to monitor changes in the chemical and bacteriological levels of groundwater. Emphasis will be placed on developing operational guidelines for this type of sewage disposal system. (Bates-East Central)
W78-00122

WASTE HANDLING AND DISPOSAL GUIDELINES FOR INDIANA POULTRYMEN.
Purdue Univ., Lafayette, IN. Animal Waste Committee.
For primary bibliographic entry see Field 5G.
W78-00126

WASTE HANDLING AND DISPOSAL GUIDELINES FOR INDIANA SWINE PRODUCERS.
Purdue Univ., Lafayette, IN. Animal Waste Committee.
For primary bibliographic entry see Field 5G.
W78-00127

WASTE HANDLING AND DISPOSAL GUIDELINES FOR INDIANA BEEF PRODUCERS.
Purdue Univ., Lafayette, IN. Animal Waste Committee.
For primary bibliographic entry see Field 5G.
W78-00128

NITROGEN AND PHOSPHORUS: FOOD PRODUCTION, WASTE AND THE ENVIRONMENT.
New York State Coll. of Agriculture and Life Sciences, Ithaca.

For primary bibliographic entry see Field 5B.
W78-00130

FLOWS OF NITROGEN AND PHOSPHORUS ON LAND,
New York State Coll. of Agriculture and Life Sciences, Ithaca. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W78-00132

COASTAL WATER RESEARCH PROJECT ANNUAL REPORT FOR THE YEAR ENDED 30 JUNE 1976.
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5C.
W78-00134

CHROMIUM SPECIATION IN MUNICIPAL WASTEWATER AND SEAWATER,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5B.
W78-00135

FAUNA OF OFFSHORE STRUCTURES,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5C.
W78-00158

RESPONSE AND RECOVERY OF THE BENTHOS AT ORANGE COUNTY,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5C.
W78-00159

PARTIAL RECOVERY OF THE BENTHOS AT PALOS VERDES,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5C.
W78-00160

COMPARISON OF THE BENTHOS AT SEVERAL WASTEWATER DISCHARGE SITES,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5C.
W78-00161

DISPOSAL OF ORGANOCHLORINE WASTES BY INCINERATION AT SEA,
Environmental Protection Agency, Washington, DC. Office of Water and Hazardous Materials.
T. A. Wastler, C. K. Offutt, C. K. Fitzsimmons, and P. E. Des Rosiers.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-253 979, Price codes: A10 in paper copy, A01 in microfiche. Environmental Protection Agency, Final Environmental Impact Statement Maritime Administration Chemical Waste Incinerator Ship Project, Report EPA-430/9-75-014, July 1975. 237 p, 6 fig, 6 tab, 6 append.

Descriptors: *Waste disposal, *Water pollution sources, *Chemical wastes, *Incineration, Gulf of Mexico, *Monitoring.
Identifiers: *Outer Continental Shelf, *Ocean dumping Organochlorine, Offshore mining, Chlorinated hydrocarbons, Trichloropropane, Trichloroethane.

The first officially sanctioned incident of ocean incineration in the United States occurred aboard the M/T VULCANS in the Gulf of Mexico from October 1974 through January 1975 under an ocean dumping permit for ocean incineration of organochlorine wastes. The report described the monitoring activities undertaken to evaluate ocean incineration as a disposal method. Stack gas emissions were monitored for plume dispersion characteristics and to determine combustion efficiency. The findings indicate that more than 99.9 percent of the wastes were oxidized. Marine monitoring surveys indicate that there were no measurable increases in concentrations of trace metals and organochlorides in the water and marine life. Results of the project indicate that ocean incineration could be a viable alternative of waste disposal which should be considered along with other disposal methods including direct ocean disposal, land disposal, and land incineration. (Sinha-OEIS)
W78-00165

ECONOMIC ANALYSIS OF SPRAY IRRIGATION OF POULTRY PROCESSING WASTEWATER VS. UPGRADING OF WASTEWATER TREATMENT FACILITIES,
Mogul Corp., Chagrin Falls, OH.
For primary bibliographic entry see Field 5D.
W78-00179

CHICK HATCHERY WASTES DISPOSAL,
Buchart-Horn, Lewisburg, PA.
M. Goldman.
Industrial Wastes, January/February 1977, p 28-31, 5 tab.

Descriptors: *Cost comparison, *Feasibility studies, *Land use, *Waste disposal, Fertilizers, Food processing industry, Industrial wastes, Water analyses, Pennsylvania.
Identifiers: *Poultry processing wastes, Equalization, Chemical coagulation, Land application.

In February 1976, the Snyder County, Pennsylvania sewage treatment plant encountered operating difficulties associated with poor effluent quality, caused by high organically loaded wastes from an egg hatchery. Wastes consist of eggshells, infertile eggs, dead chicks, washwater from cleaning operations, and ordinary sanitary wastewater. Three approaches were considered in studying the problem by Buchart-Horn Consulting Engineers: (1) Chemial pretreatment with discharge of the partially treated waste to the sewage treatment plant; (2) equalization of the waste flow to the sewage treatment plant and acclimation of treatment microorganisms to the heavier organic loadings (3) disposal of egg shell and liquid waste on farmland. All three solutions appeared technically feasible. Composite samples were analyzed and are tabulated. An economic analysis (costs comparison) showed land disposal to be least expensive. The waste is high organic, high-nitrogen material, with N-P-K values of 15-trace-0. Economics involved with the land application are discussed. (Prodehl-EPA, Corvallis)
W78-00186

SLUDGE HANDLING AND DISPOSAL: A SPECIAL REPORT,
Nalco Chemical Co., Oak Brook, IL.
J. A. Beardsley, F. J. Biermann, A. Blok, W. R. Hallen, and J. D. Innes.
Pollution Engineering, Vol 8, No 1, p 22-33, January 1976. 11 fig, 14 tab.

Descriptors: *Sewage sludge, *Sludge treatment, *Sludge disposal, Coagulation, Dewatering, Filtration, Incineration, Design data, Economics, Costs, *Polymers.

Techniques discussed in the treatment and handling of sludge include concentration, dewatering, coagulation, gravity separation, and filtration. Disposal methods discussed are incineration and use of sludge as a fertilizer and soil conditioner. The use of organic polymers rather than metal salts as chemical conditioners for dewatering is described, advantages given, and recommended polymer application strengths and costs tabulated. Influent points of polymer addition during concentration are advised. Solids separation by vacuum filtration, gravity belt filtration, centrifuges, plate and frame filtration, gravity separation, and sludge beds are described, and some design parameters given. In determining the amounts of primary and secondary sludge, it is necessary to perform a partial solids balance on the primary clarifier, the secondary treatment process, and the sludge digester. Example calculations are shown. Two methods of incineration are discussed: (1) fluidized bed; (2) multihearth. Included is a layout plan of Organic-Recycling Inc. for processing sludge into fertilizer. (Prodehl-EPA, Corvallis)
W78-00187

EFFECTS OF DRAIN WELLS ON THE GROUND-WATER QUALITY OF THE WESTERN SNAKE PLAIN AQUIFER, IDAHO,
Geological Survey, Boise, ID. Water Resources Div.
For primary bibliographic entry see Field 5B.
W78-00197

NATURE AND EXTENT OF GROUND-WATER-QUALITY CHANGES RESULTING FROM SOLID-WASTE DISPOSAL, MARION COUNTY, INDIANA,
Geological Survey, Indianapolis, IN. Water Resources Div.
For primary bibliographic entry see Field 5B.
W78-00205

RESPONSE BY PEARL MILLET TO SOIL INCORPORATION OF WATERHYACINTHS,
Florida Univ., Gainesville. Dept. of Soil Science.
For primary bibliographic entry see Field 5G.
W78-00259

DEEPWATER DUMPSITE 106 BATHYMETRY AND BOTTOM MORPHOLOGY,
National Marine Fisheries Service, Narragansett, RI. Atlantic Environmental Group.
For primary bibliographic entry see Field 2L.
W78-00311

SIX DIVES TO THE LOWER CONTINENTAL SLOPE AND UPPER CONTINENTAL RISE SOUTHWEST OF HUDSON CANYON GEOLOGICAL ASPECTS,
Lamont-Doherty Geological Observatory, Palisades, NY.
For primary bibliographic entry see Field 2L.
W78-00312

THE GENERAL PHYSICAL OCEANOGRAPHY OF DEEPWATER DUMPSITE 106,
National Marine Fisheries Service, Narragansett, RI. Atlantic Environmental Group.
For primary bibliographic entry see Field 2L.
W78-00313

PHYSICAL OCEANOGRAPHY OF DEEPWATER DUMPSITE 106, UPDATE: JULY 1975,
National Marine Fisheries Service, Narragansett, RI. Atlantic Environmental Group.
For primary bibliographic entry see Field 2L.
W78-00314

CLIMATIC STUDY OF NEW YORK BIGHT,
National Climatic Center, Asheville, NC.
For primary bibliographic entry see Field 2B.
W78-00316

PHYTOPLANKTON IN THE VICINITY OF DEEPWATER DUMPSITE 106,
Woods Hole Oceanographic Institution, MA.
For primary bibliographic entry see Field 5C.
W78-00317

DEEPWATER DUMPSITE 106: ZOOPLANKTON STUDIES,
National Marine Fisheries Service, Narragansett, RI. Narragansett Lab.
For primary bibliographic entry see Field 5B.
W78-00318

GELATINOUS ZOOPLANKTON AT DEEPWATER DUMPSITE 106,
Woods Hole Oceanographic Institution, MA.
For primary bibliographic entry see Field 5B.
W78-00319

APEX PREDATORS IN DEEPWATER DUMPSITE 106,
National Marine Fisheries Service, Narragansett, RI. Narragansett Lab.
For primary bibliographic entry see Field 5C.
W78-00320

DISTRIBUTION AND ABUNDANCE OF MESOPELAGIC FISHES ON CRUISES 2 AND 3 AT DEEPWATER DUMPSITE 106,
Rhode Island Univ., Kingston. Dept. of Zoology.
For primary bibliographic entry see Field 5B.
W78-00321

OBSERVATIONS FROM THE DSRV ALVIN ON POPULATIONS OF BENTHIC FISHES AND SELECTED LARGER INVERTEBRATES IN AND NEAR DWD-106,
National Marine Fisheries Service, Washington, DC. Systematics Lab.
For primary bibliographic entry see Field 5C.
W78-00322

EPIBENTHIC INVERTEBRATES,
National Marine Fisheries Service, Narragansett, RI. Atlantic Environmental Group.
For primary bibliographic entry see Field 5C.
W78-00323

EPIFAUNAL MEGABENTHOS IN DWD 106,
Woods Hole Oceanographic Institution, MA.
For primary bibliographic entry see Field 5C.
W78-00324

FINAL REPORT ON BENTHIC INFAUNA OF DEEPWATER DUMPSITE 106 AND ADJACENT AREAS,
National Marine Fisheries Service, Highlands, NJ. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 5C.
W78-00325

NEUSTON FISH AT DWL 106,
Woods Hole Oceanographic Institution, MA.
For primary bibliographic entry see Field 5C.
W78-00326

A SUMMARY OF THE INPUT OF INDUSTRIAL WASTE CHEMICALS AT DEEPWATER DUMPSITE 106 DURING 1974 AND 1975,
National Marine Fisheries Service, Narragansett, RI. Atlantic Environmental Group.
For primary bibliographic entry see Field 5B.
W78-00327

RESULTS OF STUDIES ON THE DISTRIBUTION OF SOME TRANSITION AND HEAVY METALS AT DEEPWATER DUMPSITE 106,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 5B.
W78-00328

RECENT ANALYSES OF COPPER, CADMIUM AND LEAD AT DEEPWATER DUMPSITE 106,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 5A.
W78-00329

FINAL REPORT ON HEAVY METALS IN SMALL PELAGIC FINFISH, EUPHAUSID CRUSTACEANS AND APEX PREDATORS, INCLUDING SHARKS, AS WELL AS ON HEAVY METALS AND HYDROCARBONS (C15+) IN SEDIMENTS COLLECTED AT STATIONS IN AND NEAR DWD 106,
National Marine Fisheries Service, Milford, CT. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 5B.
W78-00330

APPENDIX, (NOAA DUMPSITE EVALUATION REPORT),
National Marine Fisheries Service, Washington, DC. National Systematics Lab.
E. M. Cohen.
In: NOAA Dumpsite Evaluation Report 77-1, Baseline Report of Environmental Conditions in Deepwater Dumpsite 106, Vol 3, Contaminent Inputs and Chemical Characteristics - Appendix, p 565-798, June 1977. 10 append.

Descriptors: *Baseline studies, *Waste disposal, *Environmental effects, *Water pollution, Ecology, Phytoplankton, Zooplankton, Benthos, Predation, Nekton.
Identifiers: *Outer continental shelf, *Ocean dumping.

This section contains baseline data in the following categories: Operational cruise report July 1975; Operational cruise report February 1976; Ten dives of the DSRV ALVIN in and near the DWD 106 dumpsite, 25 July - 3 August 1975 - Introduction, station data, general observations and conclusions; Phytoplankton data for DWD 106; Zooplankton data for DWD 106; Epibenthos data for DWD 106; Digested STD data (USCGC DALLAS) June 1976; Hydrostation data (RV KNORR) August-September 1976; Apex predator data for DWD 106; and Mid-water nekton data for DWD 106. (Sinha - OEIS)
W78-00331

AN INVESTIGATION INTO THE DISPOSAL OF BLOOD BY ANAEROBIC DIGESTION,
Kent Sewage Treatment Plant, OH.
For primary bibliographic entry see Field 5D.
W78-00462

OPERATION OF FULL-SCALE ANAEROBIC CONTACT TREATMENT PLANT FOR MEAT-PACKING WASTES,
Wilson and Co., Inc., Albert Lea, MN. Albert Lea Waste Treatment Plant.
For primary bibliographic entry see Field 5D.
W78-00465

SPRAY IRRIGATION OF WASTES FROM THE MANUFACTURE OF HARDBOARD,
Masonite Corp., Chicago, IL.
W. C. Parsons.
In: Proceedings 22nd Industrial Waste Conference, Purdue Univ., Engr. Ext. Series 129, p 602-607, May 1967. 4 fig.

Descriptors: *Irrigation system, *Irrigation effects, *Waste disposal, Biochemical oxygen demand, Chemical oxygen demand, Design criteria, Food processing industry, Industrial wastes, Land use, Suspended solids, Waste water treatment.
Identifiers: *Spray irrigation.

Description of the concepts and natural phenomena involved in purification of wastewater by irrigation and natural filtration is presented. Methods used in applying effluent from a storage lagoon, at increasing loading rates, to a field of reed canary grass are discussed. Load was gradually increased up to a satisfactory rate of 400 to 500 lb. solids/acre/day. By the end of 1964, it was firmly established that an approximate rate of 550 lbs./day/acre could be maintained on a year round basis with brief shock loads in the summer of up to 700 lbs. Various problems encountered with the vegetation from 1962 to 1965 are presented. Advantages and disadvantages of spray irrigation application of effluent are listed. BOD and COD at indicator wells, control wells, and a nearby river, over a four-year period are presented graphically. (Prodehl - EPA, Corvallis)
W78-00483

5F. Water Treatment and Quality Alteration

MUNICIPAL WATER SUPPLIES IN LEE COUNTY, FLORIDA, 1974,
Geological Survey, Tallahassee, FL. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-00198

RESIDUE TOLERANCES FOR AQUATIC HERBICIDES,
Environmental Protection Agency, DC. Chemistry Branch.
For primary bibliographic entry see Field 5G.
W78-00241

WATER PURIFICATION PROCESS,
Hoeschst A.G., Frankfurt am Main (West Germany).
K-E. Quentin, L. Weil, and H. Berger.
U.S. Patent No. 4,028,233, 5 p, 2 tab, 12 ref; Official Gazette of the United States Patent Office, Vol 959, no 1, p 300, June 7, 1977.

Descriptors: *Patents, *Water treatment, *Water purification, *Water pollution treatment, Separation techniques, Flocculation, Polymers, Oily water, Organic wastes, Potable water.
Identifiers: *Hydrocarbon removal.

Drinking water is prepared by a process for removing hydrocarbons or halogenated hydrocarbon contaminants dissolved in crude water in concentrations below 10 mg/l. The water is mixed with a polymer substance selected from the group consisting of a polymer of ethylene, a polymer of substituted ethylene and a copolymer of ethylene and less than 50% by weight of another ethylenically unsaturated monomer. The crude water is subjected to a conventional flocculation procedure either before, during or after the mixing or after the mixing with polymer substance and then separated from the polymer substance and flocculant. (Sinha-OEIS)
W78-00280

BUFFERING AGENTS,
Aerojet-General Corp., El Monte, CA. (Assignee).
For primary bibliographic entry see Field 3A.
W78-00281

APPARATUS FOR AND METHOD OF RECOVERING WATER USED TO BACKWASH AND RINSE A FILTER,
Hungerford and Terry, Inc., Clayton, NJ. (Assignee).
R. R. Davis, A. M. Langberg, and A. P. Debus.
U.S. Patent No. 4,028,241, 9 p, 3 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 959, no 1, p 302, June 7, 1977.

Descriptors: *Patents, *Water treatment, *Water purification, *Water quality control, *Filtration,

Cleaning, Polyelectrolytes, Manganese, Iron, Zeolites, Separation techniques, Water reuse.
Identifiers: *Backwashing.

This invention relates generally to a system for recovering treated water used to backwash and rinse filters used to remove manganese and iron impurities from water. A recovery basin is provided into which water used to backwash and rinse a manganese oxide filter is deposited. A coagulating agent such as a polyelectrolyte is added to the backwash and rinse water, the coagulating agent and water is agitated in the recovery basin, and then the precipitates or other impurities removed from the filter are allowed to settle to the bottom of the recovery basin. The treated water from which the impurities have settled is then returned to the filter inlet and passed through the filter in normal filtering operation so that the water used to backwash and rinse the filter exits from the filtering system as pure treated water. Settling is preferred to other methods for separating the removed precipitates from the backwash and rinse water. It is preferred to employ a polyelectrolyte because settling requires less than one to two hours. (Sinha-OEIS)
W78-00286

ELECTROSTATIC WATER TREATMENT APPARATUS,
Progressive Equipment Corp., Erie, PA. (Assignee).
D. C. Clark, L. H. Silverman, and J. K. Barnard.
U.S. Patent No. 4,024,047, 4 p, 8 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 958, No 3, p 1189, May 17, 1977.

Descriptors: *Patents, *Water treatment, Water quality control, *Water pollution treatment, *Water purification, Electrolysis, Electrodes, Equipment.
Identifiers: Dielectric coating, *Electrostatic treatment.

This invention is intended to simplify the construction and increase the reliability of operation of electrostatic water treating apparatus by an improved structure for supporting the charging electrode and for preventing injury to the dielectric coating during assembly or disassembly for inspection and repair. A hollow electrode having an insultating coating on its outer surface is positively charged by a high voltage. The electrode is at the center of an externally grounded metal shell and the water to be treated enters through a fitting. While the annular stream of water flows past the electrode the positive charge on the electrode attracts free electrons from the water and minerals and causes electron collisions with mineral and biological material in the water. As a result, the mineral and biological materials settle out and may be periodically flushed down a drain. (Sinha - OEIS)
W78-00294

APPARATUS AND METHOD USING ACTIVATED CARBON TO PURIFY LIQUID WASTES,
Eastman Kodak Co., Rochester, NY. (Assignee).
For primary bibliographic entry see Field 5D.
W78-00304

WATER FILTER DEVICE,
Gelman Instrument Co., Ann Arbor, MI. (Assignee).
C. Gelman, and A. Vadnay.
U.S. Patent No. 4,025,438, 7 p, 6 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 958, no 4, p 1662, May 24, 1977.

Descriptors: *Patents, *Water treatment, *Water purification, *Water pollution treatment, Filtration, Domestic water, Water quality control, *Carbon filters, Potable water, Separation techniques.

There is need for a water filtering device for attachment to a faucet which at one and the same time provides potable water for today's high standards for potable water, and on a cost basis which is easily within the budget of the average householder. The object of this invention is to fulfill this need. A water filter and water filter cartridge is provided having an upper water filtering layer containing charcoal particles, a lower filtering layer having a submicron pore size and an intermediate filtering layer having a pore size greater than that of the lower layer but less than the particle size of the charcoal in the upper layer. (Sinha-OEIS)
W78-00308

INSOLUBLE ADSORBER RESIN SUITABLE FOR TREATING DRINKING WATER AND SEWAGE,
Farbenfabriken Bayer A.G., Leverkusen (West Germany). Assignee.
H. Corte, H. Heller, M. Lange, and O. Netz.
U.S. Patent No. 4,025,705, 4 p, 1 tab, 4 ref; Official Gazette of the United States Patent Office, Vol 958, no 4, p 1729, May 24, 1977.

Descriptors: *Patents, *Water treatment, Water quality control, *Water purification, *Adsorption, Odors, Taste-producing algae, Water pollution treatment, *Resins, *Polymers.

A process for removing oleophilic odor- and taste-producing substances from water by treatment with an insoluble macroporous absorber resin comprises a matrix based on a crosslinked organic polymer containing aromatic nuclei, the polymer containing chloromethyl groups as substituents; some of the chlorine atoms in the chlormethyl groups can be reacted with ammonia or amines. The polymers used as matrix in the process are known such as, copolymers containing monomeric units of an aromatic monovinyl compound and at least one aromatic polyvinyl compound have proved to be particularly advantageous. (Sinha-OEIS)
W78-00310

OZONE DISINFECTION OF FLOWING WATER,
Oregon Dept. of Fish and Wildlife, Clackamas.
J. F. Conrad, R. A. Holt, and T. D. Kreps.
The Progressive Fish Culturist, Vol. 37, No. 3, p. 134-136, 1975; 2 tab, 4 ref.

Descriptors: *Design, *Research and development, *Research equipment, *Fish diseases, *Fish hatcheries, *Aquatic bacteria, *Ozone, *Disinfection, Fish handling facilities, Fish parasites, Salmonids, Salmon, Aquaria, Water purification, Aquiculture.
Identifiers: *Ozone disinfection, Flexibacter columnaris.

A small experimental ozonator capable of producing 1 g ozone/hr of capacity to disinfect 22.7 l/min waterflow was developed. Spring water regulated at 13 degrees and 21 degrees was introduced into a 132-l reservoir and distributed into four tanks. Water flow to 2 tanks passed through a mixing chamber where it was exposed to ozone. Tests on the efficiency of ozone for inactivating bacterial flora (Flexibacter columnaris) were made with coho salmon fingerlings. Tests demonstrated that ozone significantly reduced the numbers of viable F. columnaris cells in flowing water. (Katz)
W78-00432

5G. Water Quality Control

USING FOOD-PROCESSING WASTEWATER FOR IRRIGATION,
California Univ., Parlier. Cooperative Extension.
For primary bibliographic entry see Field 5E.
W78-00026

MEETING BPT STANDARDS FOR REFINERY WASTEWATER TREATMENT.
Engineering-Science, Inc., Pasadena, CA.
For primary bibliographic entry see Field 5D.
W78-00041

SURVEYING MASSACHUSETTS' HAZARDOUS WASTES,
GCA Corp., Bedford, MA.
For primary bibliographic entry see Field 5E.
W78-00059

PRETREATMENT STRATEGIES FOR INDUSTRIAL WASTE CONTROL PROPOSED BY EPA,
S. J. Hadeed.
Journal Water Pollution Control Federation, Vol 49, No 7, p 1578-1580, July, 1977. 1 tab.

Descriptors: *Industrial wastes, *Legislation, *Regulation, *Sewage treatment, *Pre-treatment(Water), Water pollution control, Municipal wastes, Treatment facilities, Metals, Toxicity, *Waste water treatment, Water quality standards.
Identifiers: *Industrial waste pre-treatment.

Since industrial pollutants entering public-owned treatment works may interfere with treatment processes, limit sludge disposal alternatives, and require additional treatment, four proposed alternative pretreatment strategies for the control of industrial wastes discharged to municipal sewer systems are discussed. The options include local enforcement of technology standards; local enforcement of technology standards or water quality variances; local enforcement of toxic technology standards; and federal/state enforcement of technology standards. In general, the options differ according to primary enforcement responsibility and in terms of the number and type of pollutants and sources that would be covered by national standards. According to the new regulations, pollutants will be classified on the basis of being compatible or incompatible with a public-owned treatment works. The proposed pretreatment strategies are part of a series of regulations on industrial waste control which have been designated to replace the existing pretreatment regulation, 40 CFR 128. (Schulz-FIRL)
W78-00061

PESTICIDE POLLUTION STUDIES.
Public Health Service, Atlanta, GA. Div. of Water Supply and Pollution Control.
For primary bibliographic entry see Field 5B.
W78-00098

WASTE DISPOSAL IN BEEF FEEDLOTS,
New Zealand Agricultural Engineering Inst., Lincoln.
D. J. Hills.
New Zealand Journal of Agriculture, Vol. 128, No. 3, p. 33-35, March, 1974. 5 fig.

Descriptors: *Feed lots, Management, Agricultural runoff, Water pollution, Groundwater, *Waste disposal, *Farm wastes, Rates of application.
Identifiers: *New Zealand, Windrows, Land spreading.

Feedlot management practices in the United States that could be adapted in New Zealand are described. Two problems associated with feedlot waste are removal and disposal of manure, and the possible water pollution of streams, lakes, and groundwater when rainfall runoff comes in contact with the manure. The manure should be rationed on the feedlot surface so that biological decomposition and drying process will reduce the quantity and improve its characteristics. Then the waste should be removed from the feedlot surface mechanically once or twice a year and stockpiled or windrowed. The next step is to transport it to

and spread it on farm land, not so much for its fertilizer value, but because land disposal is a low-cost method of disposal. One acre of crop land can safely use 10 tons of dry manure a year. The management of feedlot runoff depends on the hydrology and topography of the location of the feedlot. Rain falling into the feedlot should be collected in drain ditches, pass through a settling basin and be stored in a detention pond. This stored runoff should be spread on crop land before the next storm. The location of a feedlot farm should be about 3 miles from urban area, at least 1 mile from a housing development and 0.5 miles from the nearest residence. (East Central)
W78-00117

LIVESTOCK WASTE MANAGEMENT - STATE OF THE ART,
Agricultural Research Service, Lincoln, NE.
C. B. Gilbertson.
Report presented at the request of the Institute on Environmental Quality, State of Illinois, Carbondale, Illinois, and entered as testimony in the State of Illinois Public Hearing Minutes, February 1, 1973. 9 p. 14 ref.

Descriptors: Feed lots, *Livestock, Cattle, Nebraska, Odor, Agricultural runoff, Water pollution, Groundwater, Overland flow, *Reviews, *Farm wastes, *Management, Rates of application, *Waste disposal.
Identifiers: *Waste management, Soil pollution, Land application.

An overview of livestock waste management problems and research results is presented. Beef cattle on outdoor feedlots are particularly considered. The report is based on results derived from research initiated in 1968 on beef cattle feedlots located in Nebraska and from the author's personal experience. Included are brief descriptions of beef cattle feedlots, the quantity and quality of feedlot runoff, groundwater and soil pollution potential, and methods of runoff control. Research is still required to determine: (1) Alternative systems to relieve odors from livestock operations (outdoor and housed feedlots), (2) Alternatives for debris basin cleaning or management, (3) Recommended land application rates of liquids and solids that will not have long-term, adverse effects on soil, groundwater, and crops, (4) Effect of ration on runoff quantity and quality, (5) Effect of distance of overland flow, topography, and vegetation cover on pollution characteristics of feedlot runoff, and (6) Materials handling and processing component design for alternate methods of utilization of animal wastes other than land disposal. (Merryman-East Central)
W78-00118

PRODUCTION AND TRANSPORT OF GASEOUS NH3 AND H2S ASSOCIATED WITH LIVESTOCK PRODUCTION,
Oregon State Univ., Corvallis. Dept. of Agricultural Engineering.
J. R. Miner.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 908, Price codes: A05 in paper copy, A01 in microfiche. Environmental Protection Agency, Report EPA-600/2-76-239, Sept. 1976. 70 p, 7 fig. 26 tab, 59 ref.

Descriptors: *Air pollution, Water pollution, *Odor, *Ammonia, *Hydrogen sulfide, Amines, Masking agents, Rations, Cattle manure, Confinement pens, Surfaces, *Farm wastes, *Gases, *Livestock.

Current livestock production techniques release a large variety of volatile organic compounds to the atmosphere. This release results in complaints due to their odorous nature and has been identified as a source of surface water pollution as these compounds are absorbed from the air. Ammonia has been identified as the compound of greatest concern relative to water pollution and is of considerable interest relative to odor complaints due to its ease of measurement and its relationship to more odorous gas evolution. Gas sampling and measuring schemes based upon the use of solid absorbents were studied. Use of an absorbent suspended in a stainless steel screen container which could be exposed in an atmosphere to be sampled showed promise. The evolution of ammonia, hydrogen sulfide and odorous volatiles was investigated as a function of beef cattle ration. Addition of essential oil, mint oil, was found to mask the odor of fresh manure. Mint oil was carried in the urine. Ammonia evolution from fresh manure was largely from urine. Fecal contributions became significant only after significant decomposition had occurred. A technique was devised for measuring ammonia evolution rates from surfaces. This measurement provided an accurate measure of anaerobic biological activity and a quantitative means for comparing treatment procedures designed to minimize volatile material evolution rates. Evolution rates for a variety of surfaces associated with livestock production enterprises were measured. (East Central)
W78-00120

FEEDLOTS AND RECREATION LAKES: AN EXAMPLE OF HOW THEY CAN BE GOOD NEIGHBORS,
Agricultural Research Service, Lincoln, NE.
J. A. Nienaber, J. L. Gartung, and C. B. Gilbertson.
Reprint from Farm, Ranch, and Home Quarterly, Nebraska Agricultural Experiment Station, Vol. 22, No. 2, Summer, 1975, 2 p. 1 fig.

Descriptors: *Feed lots, Agricultural runoff, Irrigation, Rainfall, Lakes, Recreation, Ponds, *Waste disposal, Farm wastes, Pollution abatement.
Identifiers: *Recreation lakes, Runoff control, Debris basins, Holdings ponds, Land disposal.

A feedlot disposal system was designed by the Agricultural Engineering Department of the University of Nebraska-Lincoln to prevent contamination of a recreational lake. EPA awarded a contract to L. P. Schram Feedlot Inc. to carry out research in cooperation with the University. Three system components were used to manage precipitation runoff from the feedlot: (1) debris basin, which collected runoff and removed settleable solids from the liquid to be handled with conventional pumps, (2) holding pond, which collected liquid drained from debris basin and stored it for application to the land, (3) disposal system which distributed liquids on the land by irrigation techniques. The system provided sufficient runoff control in both average and above average rainfall periods. (Albertson-East Central)
W78-00123

WASTE HANDLING AND DISPOSAL GUIDELINES FOR INDIANA POULTRYMEN.
Purdue Univ., Lafayette, IN. Animal Waste Committee.
Publication Number ID-82, 1972, Cooperative Extension Service, Purdue University. 13 p. 2 fig, 3 tab.

Descriptors: *Waste disposal, *Indiana, Legal aspects, *Regulation, *Water pollution, Odor, Liquid wastes, Solid wastes, Drying, Incineration, Flies, *Waste water disposal, Rates of application, Farm wastes.
Identifiers: Waste management, Poultry wastes, Digestion methods, *Land application.

The purpose is to briefly explain the pollution laws and regulations that directly affect Indiana poultry producers and to provide waste handling and disposal guidelines that will prevent pollution problems. The Indiana Stream Pollution Control Board and the Indiana Air Pollution Control Board have the authority to control and prevent water and air pollution in the state of Indiana. Indiana's Confined Feeding Control Law supplements the Indiana Stream Pollution Control Law in attempting to prevent water pollution. It is now against the law for anyone to start building a confined feeding operation without approval by the Stream Pollution Control Board. The production system that a poultryman adopts depends largely on the kind of poultry he produces (broilers, layers, etc.). Manure production rates for the different kinds of birds are given. Solid manure handling systems include shallow pit system, deep pit system, litter system, and partial slotted-floor system. The shallow pit system may also be adapted to liquid handling, but it is not recommended for new housing because of extra labor for frequent cleaning, greater volume of waste because of the extra water used for cleaning, pollution danger from disposing during the winter, and probable odors. Outdoor confinement rearing can be a source of pollution; therefore, proper management of these facilities is essential. Poultry confinement units are sources of odor and fly problems. Odor and fly control methods are discussed. Poultry wastes may be disposed by means of drying methods, incineration methods, digestion methods, or land application methods. Design recommendations are given for the various management and disposal methods that are discussed. Guidelines are given for returning poultry wastes to the land. Suggestions are given for minimizing odor during disposal. Suggestions are given for treating and disposing of wastewater. (Rowe-East Central)
W78-00126

WASTE HANDLING AND DISPOSAL GUIDELINES FOR INDIANA SWINE PRODUCERS.
Purdue Univ., Lafayette, IN. Animal Waste Committee.
Publication Number ID-83, Cooperative Extension Service, Purdue University, 1972, 12 p. 2 fig, 2 tab.

Descriptors: *Waste disposal, *Indiana, Legal aspects, *Regulation, *Water pollution, Liquid wastes, Solid wastes, Agricultural runoff, *Farm wastes.
Identifiers: Waste management, *Swine wastes, Land application, Odor control, Housing.

The purpose was to acquaint the Indiana swine producer with present pollution laws and regulations that most directly affect him and to present waste handling and disposal guidelines that will help the producer determine how nearly he complies with these laws and regulations or how he might develop a system that will comply. The Indiana Stream Pollution Control Board and the Indiana Air Pollution Control Board have the authority to control and prevent water and air pollution in the state of Indiana. Indiana's Confined Feeding Control Law supplements the Indiana Stream Pollution Control Law in attempting to prevent water pollution. It is now unlawful for anyone to start construction of a confined feeding operation without prior approval by the Stream Pollution Control Board. The type of swine waste handling system used depends upon location, number of animals, and method of housing. Housing systems include pasture, drylot, and enclosed. Management recommendations are made for each of these types of systems. Drylot and enclosed systems of management call for waste handling and storage facilities that may be categorized as follows: (1) solid manure handling systems, (2) liquid manure handling systems, and (3) partial-treatment manure handling systems. Methods of waste handling which are utilized under each of these categories are described. Most swine producers still dispose of their swine manure by returning it to the land by surface application, surface application with immediate plowdown, or injection or knifing into the soil. Factors affecting land application are manure nitrogen content, loss of nitrogen by volatilization and denitrification before field application, type and management of crops to be grown, and the soil itself. Guidelines

are given for determining acceptable application rates. Precautions are outlined which should be considered when applying wastes. Odor control techniques are given for minimizing odor during disposal. (Rowe-East Central)
W78-00127

WASTE HANDLING AND DISPOSAL GUIDELINES FOR INDIANA BEEF PRODUCERS.
Purdue Univ., Lafayette, IN. Animal Waste Committee.
Publication Number ID-84, 1972, Cooperative Extension Service, Purdue University. 13 p. 3 fig, 3 tab.

Descriptors: *Waste disposal, *Indiana, Legal aspects, *Cattle, Regulation, Design, Solid wastes, Liquid wastes, Waste storage, *Water pollution, Agricultural runoff, *Farm wastes, Rates of application.
Identifiers: Waste management, Housing systems, Land disposal, Odor control.

The purpose is: (1) to acquaint the Indiana beef producer with present pollution laws and regulations that most directly affect him, and (2) to present waste handling and disposal guidelines that will help the beef man determine how nearly he complies with these laws and regulations or how he might develop a system that will comply. The Indiana Stream Pollution Control Board and the Indiana Air Pollution Control Board have the authority to adopt and enforce rules and regulations concerning their respective types of pollution problems. Indiana's Confined Feeding Control Law supplements the Indiana Stream Pollution Control Law in attempting to prevent water pollution. It is now against the law for anyone to start building a confined feedlot operation without approval by the Stream Pollution Control Board. The kind of waste handling system a beef producer should have depends upon the location of his operation, the number of animals, and how they are housed. Guidelines are given for design and management of pasture systems, feedlot systems, and total confinement systems. Types of beef waste handling and storage facilities include: (1) solid manure handling systems, (2) liquid manure handling systems, and (3) partial-treatment manure handling systems. Design recommendations are given for the various methods of handling these wastes. The last step of any manure handling system is disposal of the waste product. Most beef producers dispose of the manure by returning it to the land. A discussion is given concerning factors affecting land application rates, how acceptable land application rates may be determined, and precautions that should be taken when returning manure to the land. Suggestions for minimizing odor problems during disposal are given. (Rowe-East Central)
W78-00128

POLLUTION POTENTIAL OF MANURE SPREAD ON FROZEN GROUND,
Agricultural Research Service, Morris, MN.
For primary bibliographic entry see Field 5B.
W78-00129

NITROGEN AND PHOSPHORUS: FOOD PRODUCTION, WASTE AND THE ENVIRONMENT.
New York State Coll. of Agriculture and Life Sciences, Ithaca.
For primary bibliographic entry see Field 5B.
W78-00130

THE INFLUENCE OF HUMAN ACTIVITY ON THE EXPORT OF PHOSPHORUS AND NITRATE FROM FALL CREEK,
Cornell Univ. Agricultural Experiment Station, Ithaca, NY. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W78-00131

ECONOMIC ANALYSIS OF REDUCING PHOSPHORUS LOSSES FROM AGRICULTURAL PRODUCTION,
Cornell Univ. Agricultural Experiment Station, Ithaca, NY. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 5B.
W78-00133

SUPERTANKERS AND SUPERPORTS (CITATIONS FROM THE ENGINEERING INDEX DATA BASE).
National Technical Information Service, Springfield, VA.
For primary bibliographic entry see Field 5B.
W78-00164

AMI DESCRIBES HOW MEAT PLANTS HAVE SAVED ENERGY.
American Meat Inst., Washington, DC. Energy Task Force.
For primary bibliographic entry see Field 3E.
W78-00171

TOTAL SYMBIOTIC POLLUTIONLESS SYSTEMS FOR EFFICIENCY MANAGING WATER, EFFLUENTS, SOLID ORGANIC WASTES, AND ODORS IN FOOD PROCESSING AND SIMILAR INDUSTRIES,
Manitoba Univ., Winnipeg. Dept. of Food Science.
For primary bibliographic entry see Field 5D.
W78-00185

OPTIMAL AERATION POLICIES FOR THE ABATEMENT OF POLLUTION IN RIVER BASINS,
Columbia Univ., New York. Dept. of Mechanical Engineering.; and Columbia Univ., New York. Dept. of Nuclear Engineering.
R. W. Longman.
Completion Report, August 1977, 150 p. OWRT B-053-NY(1), 14-34-0001-6102.

Descriptors: *River basins, *Optimization, *Aeration, *Energy conservation, Networks, Management, Filters, *Water quality, *Pollution abatement, Water pollution control.
Identifiers: *In-stream aeration, Artificial aeration.

Under appropriate conditions, substantial monetary savings can be realized by using artificial in-stream aeration, rather than more conventional techniques, to improve the environmental quality of heavily polluted rivers. Careful attention to efficient management of such systems can result in a saving of 175,000 kilowatt-hours per day in electrical energy expended in operation. Methods of optimally controlling each aerator in an aeration system are determined. Feedback control policies are obtained in order to automatically account for changing conditions. A stochastic model is used to include uncertainties in plant driving terms and water quality measurements. Kalman filters are developed for use as water quality estimates when DO, time lagged BOD, and TOC measurements are available. A regional approach is taken in the development of the optimal control policies so that aeration in a region containing one or more rivers together with their tributaries is treated. The regional interdependence of optimal aeration rates in one tributary on water quality in other tributaries is illustrated.
W78-00213

CRITERIA FOR THE ECOLOGIC EVALUATION OF THE LOWER RIVER MAIN: II. INVESTIGATIONS OF THE ORGANIC METABOLIC PROCESSES, (IN GERMAN),
Forschunginstitut und Natur-Museum Senckenberg, Frankfurt am Main (West Germany).
For primary bibliographic entry see Field 5B.
W78-00217

RESPONSE OF POTAMOGETON PECTINATUS L. TO NORFLURAZON,
Massachusetts Univ., East Wareham. Lab. of Experimental Biology.
R. M. Devlin, and S. J. Karczmarczyk.
Aquatic Botany, Vol. 1, No. 3, p. 263-268, September 1975. 2 tab, 19 ref.

Descriptors: *Herbicides, *Aquatic weed control, Light intensity, Drainage effects, Environmental effects, Stagnant water, Horticultural crops, Cranberries, Massachusetts.
Identifiers: *Potamogeton pectinatus L., *Norflurazon, Cranberry growers.

The present study examines effects of the herbicide norflurazon, on Potamogeton pectinatus L., grown under high and low light intensities in the laboratory. This weed often clogs ditches in cranberry bogs in southeastern Massachusetts. P. pectinatus growing under a light intensity of 10, 760 lux, and norflurazon showed a significant reduction in chlorophyll content. At low concentrations of 0.01 and 0.1 mg/l, total chlorophyll was down 8 and 22% respectively. A dose of 1 mg/l of norflurazon, resulted in a sharp and probably lethal drop in chlorophyll content of 75%. Doses of 10 and 100 mg/l caused practically total chlorosis. Reduction of chlorophyll-a and b due to the herbicide paralleled that of total chlorophyll. Chlorophyll production was considerably lower when it was grown under a low light intensity of 108 lux. The influence of norflurazon on chlorophyll of low light intensity plants was greatly reduced. High light intensity caused a 75% reduction of chlorophyll content with 1 mg/l of norflurazon, while there was only a 37% reduction at the lower intensity. At 10 mg/l, norflurazon only caused a 38% reduction in low light intensity plants. Aside from effects on chlorophyll content, it had no other observable effects on the plants. The data suggest that norflurazon should be directly tested as an aquatic weed herbicide and that good control could be obtained where there is good light penetration and relatively stagnant water. (Spaeth-Wisconsin)
W78-00221

SUITABILITY OF SHELLFISH FOR PROCESSING: 2. SEASONAL CHANGES IN HEAVY METAL CONTENT OF BABY CLAM, (IN KOREAN)
Pusan Fisheries Coll. (Republic of Korea). Dept. of Food Science and Technology.
For primary bibliographic entry see Field 5A.
W78-00225

BASIC DATA AND ANALYSES: SELECTED ASPECTS OF GREAT LAKES ENFORCEMENT.
Enviro Control, Inc., Rockville , Md.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-253 327, Price codes: A05 in paper copy, A01 in microfiche. Report to Environmental Protection Agency, Washington, D. C., December 1971. 72 p, 11 tab, 16 ref. 68-04-0018.

Descriptors: *Water pollution, *Legislation, *Effluents, *Great Lakes, Lake Michigan, Lake Superior, Lake Erie, Legal aspects, Regulation, Water quality control, Baseline studies, *Law enforcement.

In an effort to analyze the legal and historical basis of water discharge enforcement in the Great Lakes, cases of 343 dischargers under enforcement proceedings are analyzed by types of pollution problems, enforcement mechanisms used, compliance status, and economic impact. Findings are related to differences among states, and the relative impact of state and federal programs. Legal tools available to enforcement personnel are surveyed, and results of legal action by state and federal agencies are analyzed. Water pollution legislation and judicial precedents prior to the environmental legislation of the 1960's, as well as current state and federal legislation, are also

reviewed. The study area includes the drainage basins of lakes Erie, Michigan, and Superior. Tables five categorizations of (1) pollution problems, (2) types of enforcement, and (3) compliance status. A breakdown of pollution problems by lake basin is presented. The most widespread pollution problems are solids (36% of all cases), BOD (18%), oil (16%), heavy metals (14%), nutrients (13%), acidity (9%), and cyanides (7%). Lakes Erie and Michigan primarily have problems with BOD, soil, and heavy metals, while in Lake Superior the problems center around BOD and solids. Enforcement status by basin and state, and construction compliance status, are given in tables. (Lynch-Wisconsin)
W78-00232

COMPARATIVE EVALUATION OF WATER QUALITY ON THE ST. JOSEPH RIVER (MICHIGAN AND INDIANA, U.S.A.) BY THREE METHODS OF ALGAL ANALYSIS,
California Academy of Sciences, San Francisco. Dept. of Zoology.
For primary bibliographic entry see Field 5A.
W78-00236

ENVIRONMENTAL CONTROL OF PRIMARY PRODUCTIVITY IN ALASKAN TUNDRA PONDS,
North Carolina State Univ. at Raleigh. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W78-00237

STATUS OF CLASSIFICATION OF AQUATIC HERBICIDES,
Environmental Protection Agency, Washington, DC. Criteria and Evaluation Div.
L. W. J. Anderson.
Journal of Aquatic Plant Management, Vol. 14, June 1976, p 1-3. 1 tab.

Descriptors: Herbicides, Pesticides, *Legislation, *Pesticide toxicity, *Aquatic weed control, Legal aspects, Water pollution control, Classification.
Identifiers: *Federal insecticide, Fungicide, and Rodenticide Act of 1975, Rodenticides.

An overview is given of the amended Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), published 3 July 1975 in the Federal Register, which requires all pesticides to be classified for either 'general' or 'restricted' use. After 21 October 1977 'restricted' pesticides can be used only under supervision of Certified Applicators. The U.S. Environmental Protection Agency (EPA) is responsible both for implementation and for setting certification standards for applicators. Determinants for pesticide classification are: (1) toxicity, (2) use, and (3) labeling. Toxicity criteria relate to active ingredient(s), formulated concentration, and final use concentration. Regarding toxicity, an 'unreasonable adverse effect' is defined by FIFRA as 'any unreasonable risk to man or the environment, taking into account the economic, social and environmental costs and benefits of the use of any pesticide.' Failure to meet this standard would place the pesticide in the 'restricted' category. Many, if not most, aquatic herbicides are likely to be classified 'restricted.' A governor of a state wishing to certify applicators must submit plans to the regional EPA office for approval. Details of basic criteria for toxicity and labeling are given, along with the current status of state certification plans. (Lynch-Wisconsin)
W78-00240

RESIDUE TOLERANCES FOR AQUATIC HERBICIDES,
Environmental Protection Agency, DC. Chemistry Branch.
J. C. Cummings.
Journal of Aquatic Plant Management, Vol. 14, June 1976, p 4-6. 1 tab.

Descriptors: *Aquatic weed control, *Pesticides, *Herbicides, *Legislation, *Pesticide residues, *Potable water, Legal aspects, History, 2,4-D, 2,4,5-T, Diquat, Dalapon, Federal Government.
Identifiers: Federal Food, Drug and Cosmetic Act, Drinking Water Standards, Endothal, Glyphosate, Dichlobenil, Fenac, 2,4-D BEE, *Pesticide control policy.

The development since the late 1960's of control policies for aquatic pesticide usage and procedures for gauging pesticide residues are described. Policy development began about 1969 when federal agencies engaged in large-scale aquatic weed control programs were pressured to restrict their use of pesticides. They in turn approached federal regulatory agencies for an aquatic herbicide sanctioning mechanism. It was determined that potable water was to be considered a processed food under the Federal Food, Drug and Cosmetic Act (FFDC), and therefore pesticide residues were food additives subject to FFDC tolerances. In March of 1970 an official directive required establishment of FFDC tolerances for pesticide residues in potable water. The Food and Drug Administration, and later the Environmental Protection Agency, set about developing data requirements. Each agency petitioning for the use of pesticides has been issued specific regulations for agency policy. Due to wide variations in pesticide usage, individual pesticides are not given blanket restrictions, but are instead geared to the user agency. A table showing the status of several current petitions is presented. Tolerances for residues in potable water set by the FFDC act are compared with the EPA's Drinking Water Standards. (Lynch-Wisconsin)
W78-00241

THE AQUATIC PLANT REGULATION PROGRAM IN FLORIDA,
Florida Dept. of Natural Resources, Tallahassee. Bureau of Aquatic Plant Research and Control.
T. L. Goldsby, D. Tarver, R. Theriot, and R. Lazor.
Journal of Aquatic Plant Management, Vol. 14, June 1976, p 7-8. 1 ref.

Descriptors: *Aquatic weed control, *Regulation, *Legislation, *Florida, Aquaria, Permits, Legal aspects, Nuisance algae.

Florida is attempting to solve a severe aquatic weed problem caused by: an abundance of shallow lakes, rivers, and canals; an unusually long growing season; and most importantly, the presence of several exotic nuisance weeds. Most control efforts have been aimed at water hyacinth, hydrilla, Eurasian watermilfoil, and Brazilian elodea. Florida's extremely large aquaria industry is responsible for the introduction and spread of various exotic plants, and legislative efforts have tried to regulate this industry. A 1969 state statute prohibited import, transport, or cultivation of aquatic plants without a permit. In 1974 new regulations included lists of approved and prohibited species. All other plants would be placed on a restricted list and subject to one-year quarantine. The Federal Noxious Weed Act (effective 4 January 1975) deals with control and eradication of noxious weeds and their commerce. A list of prohibited plants is being formulated to accompany this law. (Lynch-Wisconsin)
W78-00242

POTENTIAL GROWTH OF AQUATIC PLANTS IN THE REPUBLIC OF THE PHILIPPINES AND PROJECTED METHODS OF CONTROL,
Office of the Chief of Engineers (Army), DC. Aquatic Plant Control Program.
E. O. Gangstad.
Journal of Aquatic Plant Management, Vol. 14, June 1976, p 10-14. 1 tab, 20 ref.

Descriptors: *Aquatic weed control, *River basin development, *Biocontrol, *Mechanical control, River basin development, Herbicides, 2,4-D, Water hyacinth, Agriculture, Transportation, Flood control, Nuisance algae.
Identifiers: *Philippines, *White amur, *Ctenopharyngodon idella, *Amur.

Surveys of seven Philippine Island river basins and their associated agricultural development are presented, together with an inventory of aquatic plants and measures for their control. Water hyacinth, water lettuce, and water fern are the most common floating aquatic plants. Water hyacinth is the most troublesome interfering with navigation and the operation of water control locks and gates. Of submerged plants, vallisinaria, hydrilla, and ottelia present the greatest problems. Water primrose and water morning glory are the worst marginal nuisance plants, but often can be controlled by mechanical means and the foliage used for agriculture. Aquatic plant control measures once were largely limited to mechanical devices (floating booms, draglines, and hand tools). For water hyacinth control the best means was the 'destroyer' or 'sawboat' armed with cotton-gin saws. Since World War II herbicides have been the most common aquatic plant control measure, particularly 2,4-D for water hyacinths. Biological control measures under consideration include insects and herbivorous fish. An especially-promising weed control fish is the white amur (Ctenopharyngodon idella), which is highly tolerant of temperature changes, salinity to 10,000 ppm, and oxygen concentrations as low as 0.5 ppm. It consumes more than its weight daily of submersed plants, such as pondweeds, coontail, elodea, cattails, and hydrilla. (Lynch-Wisconsin)
W78-00243

COLOR AERIAL PHOTOGRAPHY FOR AQUATIC PLANT MONITORING,
Texas A and M Univ., College Station. Remote Sensing Center.
A. R. Benton, Jr., and R. M. Newman.
Journal of Aquatic Plant Management, Vol. 14, June 1976, p 14-16. 6 ref.

Descriptors: *Aquatic weed control, *Aquatic plants, *Remote sensing, *Aerial photography, *Monitoring, *Water hyacinth, Reservoirs, Films, Texas, Cameras, Herbicides, Nuisance algae.
Identifiers: Lake Livingston(Tex), Hydrilla, Duckweed, Coontail, 2,4-D BEE, Infrared film, Watermilfoil.

Color aerial photography to detect and assess areas infested with aquatic plants was initiated in 1974 on Lake Livingston reservoir north of Houston, Texas. A. DeHavilland Beaver aircraft with two 70 mm electrically driven Hasselblad cameras was used, with Kodak Aerial Infrared Film 2443 and a yellow-orange filter, and Kodak Ektachrome MS Aerographic Film 2448 without filter. The films were developed in Kodak E-4 chemicals. Photography centered on water hyacinth and hydrilla concentrations, plus coontail and watermilfoil. The color infrared image of water hyacinth is pale to medium lavender in youth, magenta in maturity, deep red-brown in late season, and green-brown with the onset of senescence. The effect of 2,4-D BEE is clearly seen on color infrared film. An initial green-brown change is noted, followed by lightening to brown and tan. If herbicide treatment is stopped, regrowth almost always occurs, starting with lavender and darkening to magenta and rust-red. Normal color film was of much less value than the infrared. Differentiating submersed species with color photography proved more difficult than for emersed species, but was still useful. (Lynch-Wisconsin)
W78-00244

A QUANTITATIVE SAMPLING METHOD FOR HYDRILLA-INHABITING MACROINVERTEBRATES,
Florida Univ., Gainesville. School of Forest Resources and Conservation.

R. G. Martin, and J. V. Shireman.
Journal of Aquatic Plant Management, Vol. 14, June 1976, p 16-19. 3 fig, 1 tab, 7 ref.

Descriptors: *Aquatic plants, *Sampling, *Invertebrates, Census, Data collections, Florida, Insects, Diptera, Crustaceans, Gastropods, Equipment, Research equipment, Lakes.
Identifiers: *Hydrilla, Lake Wales(Fla).

A four-sided plexiglas box with a remotely-controlled blade was designed for sampling hydrilla. The blade on the bottom of the 0.5 cu m box is powered by two tightly-stretched pieces of rubber tubing, and is cocked by means of a rod inserted into a hole and controlled by a rope extending to the water surface. The box, which weighs 18.14 kg, is lowered onto the vegetation, which is then sheared off by the blade. The device was used to sample aquatic macroinvertebrates living on hydrilla in Lake Wales, Polk County, Florida, in May, June, and September of 1975. The mean number of organisms per kg of drained hydrilla were determined. Diptera larvae and pupae (chironomids) accounted for 80.7% of the total number of organisms for all samples. The gastropod Gyraulus accounted for 9.8% Ephemeroptera nymphs 3.1%, the decapod Hyalella azteca 1.5%, Trichoptera larvae 1.3%, and hydracarinids 1.1%. Large increases in chironomids and Gyraulus were noted between May-June and September. The organisms were very similar in number and Taxonomy to those inhabiting hydrilla in Lake Inglis in western Florida, and seem to represent a typical hydrilla invertebrate community for central Florida lakes. The data indicate that many invertebrates which are important food sources for fish inhabit hydrilla, although extreme amounts of hydrilla are not beneficial to the fishery. (Lynch-Wisconsin)
W78-00245

A BIOASSAY USING COMMON DUCKWEED TO EVALUATE THE RELEASE OF AVAILABLE PHOSPHORUS FROM POND SEDIMENTS,
New Jersey Dept. of Transportation, Trenton. Bureau of Environmental Analysis.
For primary bibliographic entry see Field 5A.
W78-00246

SEASONAL PRODUCTION AND GERMINATION OF HYDRILLA VEGETATIVE PROPAGULES,
Florida Univ., Gainesville. Dept. of Agronomy.
W. T. Haller, J. L. Miller, and L. A. Garrard.
Journal of Aquatic Plant Management, Vol. 14, June 1976, p 26-29. 3 fig, 2 tab, 9 ref.

Descriptors: *Aquatic weed control, *Reproduction, *Growth stages, *Drawdown, Aquatic plants, Plant growth, Florida, Reservoirs, Seasonal, Water temperature.
Identifiers: *Hydrilla, *Hydrilla verticillata, Rodman Reservoir(Fla), Propagules, Tubers, Turions, Lake Ockalawaha(Fla).

The vegetative propagules (tubers and turions) of Hydrilla verticillata are the most important sources of regrowth. Data on growth characteristics of these propagules can be used effectively for hydrilla control. A one-year study at Rodman Reservoir in north-central Florida included a 0.91 m late winter drawdown which exposed the lake bottom. One sheet each of clear and black plastic was placed over sections of the hydrilla mat to study the effect of light and dark on tuber germination. The most important information collected was on seasonal formation of propagules and the stimulatory effect of the drawdown on tuber germination. A proposed drawdown schedule for hydrilla control is as follows: an optional winter drawdown (February to April) aerates the hydrosoil, kills existing hydrilla, and promotes extensive early summer tuber germination. A second drawdown in late summer (September to November) is essential, as it kills Hydrilla regrowth from the germinated tubers, which prevents any new tuber formation. Tuber formation normally occurs from October to May. Since tubers only germinate once, and if the plant is destroyed after germination, the tuber cannot cause regrowth. Turions proved to be insignificant in causing regrowth. Optimum germination temperatures for tubers are 15-35 C, but carbon dioxide and oxygen levels in the hydrosoil are also important. (Lynch-Wisconsin)
W78-00247

SOME CHARACTERISTICS OF HYDRILLA TUBERS TAKEN FROM LAKE OCKLAWAHA DURING DRAWDOWN,
Florida Univ., Gainesville. Dept. of Agronomy.
J. L. Miller, L. A. Garrard, and W. T. Haller.
Journal of Aquatic Plant Management, Vol. 14, June 1976, p 29-31. 4 tab, 10 ref.

Descriptors: *Reproduction, *Aquatic plants, *Growth stages, *Chemical analysis, *Reservoirs, Plant growth, Florida, Drawdown, Depth.
Identifiers: *Hydrilla verticillata, *Hydrilla, *Tubers, Lake Ockalawaha(Fla), Rodman Reservoir(Fla).

Tubers are considered the primary mode of hydrilla reinfestation. A study at Lake Ocklawaha (Rodman Reservoir) in northcentral Florida in January 1975 during a drawdown attempted to define chemical and physical characteristics of tubers and to relate sprouting differences to depth. Light quality had no effect on sprouting, but light presence stimulated sprouting under both aerobic and anaerobic conditions, and appeared to have the most well-defined regulatory effect. The number and weight of tubers increased significantly with increases in depth, and tubers harvested between depths of 0.6 and 1.2 m sprouted more successfully in either light or darkness than those from 0.3 or 1.5 m depths. The presence of large numbers of mature nonsprouted tubers at great depths may be due to high concentrations of CO2 in the tubers, water, and hydrosoil. Laboratory experiments confirmed that CO2 was effective in inhibiting tuber sprouting. Starch was the main carbohydrate storage form, and Ca and K were the principal mineral components. (Lynch-Wisconsin)
W78-00248

RESPONSE OF EURASIAN WATERMILFOIL TO SUBFREEZING TEMPERATURES,
Tennessee Valley Authority, Muscle Shoals, AL. Environmental Biology Branch.
R. A. Stanley.
Journal of Aquatic Plant Management, Vol. 14, June 1976, p 36-39. 3 fig, 3 tab, 7 ref.

Descriptors: *Cold resistance, *Aquatic plants, *Aquatic weed control, Reservoirs, Biomass, Temperature, Dewatering, Nuisance algae, Tennessee Valley Authority.
Identifiers: *Eurasian water milfoil, *Myriophyllum spicatum, *Water milfoil.

Experiments show that Eurasian water milfoil (Myriophyllum spicatum), a serious aquatic weed nuisance in Tennessee Valley Authority reservoirs, may be eliminated by dewatered cold treatment of at least 1.6 days duration. Greenhouse-grown specimens in shallow water and dewatered, and the effect on final weight of roots and shoots measured. One group was exposed to variable outdoor cold temperatures submersed in 10 cm of water. A second group was exposed to a constant -1 in incubators, some submersed and some dewatered. The biomass of the roots and shoots of plants exposed to outdoor cold decreased linearly with decreasing temperature and increasing exposure time. Of plants exposed in the incubators, those dewatered suffered much more more detrimental effects than those submersed in 10 cm of water. Ninety-six hours of exposure to -1 C lowered plant biomass 99%, while submersed plants were lowered only 35%. Some data suggest that one longer exposure to cold was more effective in reducing biomass than two shorter exposures. (Lynch-Wisconsin)
W78-00249

LONG-TERM EFFECTS OF GLYPHOSATE APPLICATIONS TO PHRAGMITES,
New Jersey Agricultural Experiment Station, New Brunswick. Dept. of Soils and Crops.
D. N. Riemer.
Journal of Aquatic Plant Management, Vol. 14, June 1976, p. 39-43, 8 fig, 1 tab, 3 ref.

Descriptors: *Herbicides, *Aquatic weed control, *Pesticides, New Jersey, Rivers, Monitoring, Aquatic weed control.
Identifiers: *Glyphosate, *Phragmites communis, *Phragmites, Cohansey River(NJ).

Control of phragmites, a nuisance plant of flood plains, tidal marshes, ditches, and other low-lying, poorly drained areas, was tested with the herbicide Glyphosate to determine long-range effects of one and two applications a year apart. The herbicide was applied to phragmites on the Cohansey River flood plain near Bridgeton, N.J. in June 1972 and June 1973. Visual rating of the effects on a scale of 0 (no effect) to 10 (complete control) were made during 1972, 1973, and 1974. Differences in spray volume did not appear to affect plant vigor or stand density except at the lowest application rate (2 lb ae/A) in which 20 gpa was more effective than 80 gpa. Application of an additional surfactant was also only effective at the low application rate. The optimum application rate appears to be between 4 and 6 lb ae/A. Control with only one application declined to 50% by the end of the third growing season, while plots treated twice were still totally free of phragmites during the fourth growing season after the initial application, even those treated with the lowest rate. (Lyoch-Wisconsin)
W78-00250

DISSIPATION OF RESIDUES OF 2,4-D IN WATER, HYDROSOIL, AND FISH,
Fish and Wildlife, Warm Springs, GA. Fish Pesticide Research Lab.
D. P. Schultz, and E. O. Gangstad.
Journal of Aquatic Plant Management, Vol. 14, June 1976, p. 43-45. 1 tab, 6 ref.

Descriptors: *2,4-D, *Herbicides, *Aquatic weed control, *Pesticide residues, Pesticides, Water pollution, Water quality control, Soil contamination, Pollutants, Florida, Georgia, Water hyacinth, Fish, Ponds, Dispersion.

Tests were conducted in three ponds near Crystal River, Fla. and four near Warm Springs, Ga. to determine uptake and dissipation of the dimenthylamine salt of the herbicide 2,4-D in fish, water, and hydrosoil. All were stocked with water hyacinth to 5-10% of the surface area, along with four species of fish, then sprayed with 2.24, 4.48, or 8.96 kg 2.4-D acid equivalent per ha (.5, 1, and 2 times the recommended treatment rate). Water, hydrosoil, and fish samples were taken at intervals of from 0 to 140 days after treatment. The highest residue in water was three days after treatment (0.345 mg per liter in Florida ponds and 0.692 in Georgia ponds). Residues declined to between 0.05 and 0.005 fourteen days after treatment. In the hydrosoil the highest residue in Florida ponds was 0.046 mg per kg three days after treatment, and in ponds in Georgia 0.042 mg per kg seven days after treatment. The highest residues in fish were 0.080 mg per kg one day after treatment in Florida ponds, and 0.043 mg per kg fourteen days after treatment in the Georgia ponds. Seven days after spraying an estimated 98% of the plants were killed by the herbicide, with no apparent relationship to treatment level. (Lynch-Wisconsin)
W78-00251

BIOLOGICAL CONTROL OPERATIONS ON ALLIGATORWEED,
Office of the Chief of Engineers (Army), Washington, DC.
E. O. Gangstad.
Journal of Aquatic Plant Management, Vol. 14, June 1976, p. 50-53. 3 tab, 8 ref.

Descriptors: *Biocontrol, *Alligatorweed, *Aquatic weed control, Insects, Southeast U.S., Southwest U.S., History, South America, Aquatic plants, Hosts.
Identifiers: *Alligatorweed flea beetle, *Agasicles hygrophila, Alligatorweed thrips, Amynothrips andersoni, Stem-boring moth, Bogtia malloi, Host specificity.

Biocontrol, as the third phase (following mechanical and chemcontrol) of a U.S. Army Corps of Engineers program to suppress alligatorweed, is described. A search for insect enemies of alligatorweed, a serious problem in the southern United States, was begun in 1959 in South America by the U.S. Corps of Engineers. The alligatorweed flea beetle (Agasicles hygrophila) cannot complete its life cycle on any plant studied except alligatorweed, and will feed on only one other (Atriplex hastata). Adult flea beetles feed on surface leaves; eggs are laid on the undersides of leaves; young larvae feed on the undersurface of leaves; mature larvae bore into the stems, where they develop into adults; adults eat their way back out to begin the cycle again. The plant is either killed outright or made vulnerable to disease, wind and wave action, and competition from other plants. Release of the flea beetle was unsuccessful in South Carolina in 1964, but Florida in 1965 led to successful alligatorweed control. Additional beetles were released in other states of the South and Southeast. Chemical control methods for alligatorweed have reduced infested acres in the South from 97,186 in 1963 to 78,030 in 1973. Successful use of insect control has made possible the reduction of acres under herbicide treatment from 21,805 in 1963 to 5,594 in 1973. Where insect controls have been released alligatorweed has generally been reduced to a negligible population. Other insects released for alligatorweed control are Amynothrips andersoni and Vogtia malloi. (Lynch-Wisconsin)
W78-00253

ECOLOGICAL STUDIES OF NEOCHETINA BRUCHI AND N. EICHHORNIAE ON WATER-HYACINTH IN ARGENTINA,
Agricultural Research Service, H Hurlingham (Argentina). Biological Control of Weeds Research Lab.
C. J. Deloach, and H. A. Cordo.
Journal of Aquatic Plant Management, Vol. 14, June 1976, p. 53-59. 1 fig, 2 tab, 11 ref.

Descriptors: *Ecology, *Water hyacinth, *Aquatic weed control, *Biocontrol, Insects, Hosts, Growth stages, Reproduction, Aquatic plants, Lagoons, South America, Oviposition, South America.
Identifiers: *Neochetina bruchi, *Chevroned water hyacinth weevil, *Neochetina eichhorniae, *Mottled water hyacinth weevil, Weevils, *Argentina.

Two native Argentinian weevil species, Neochetina bruchi and N. eichhorniae, natural enemies of water hyacinth, are among the most promising control organisms, according to a study which shows how two such similar species can apparently occupy identical ecological niches and how they would interact if both were introduced into the U.S. There was little evidence of segregation of the species among plants in the same area. Seasonal alternation in abundance, evidently due to interaction of their ovipositional behavior, rates of increase, and temperature tolerances with the seasonal changes in the growth form of the plant, probably allow the coexistence of the two species on water hyacinth. They would in fact seem to complement one another in a control program by attacking plants in different growth stages and at different times of the year. However, the same balance present in Argentina might not be achieved in the U.S., because other organisms in the system are different. Both N. Bruchi and N. eichhorniae produce three generations per year; N. burchi was more abundant in summer and early fall (until March or April), and N. eichhorniae was more abundant in late fall and winter. The adult weevils of both species feed on the leaves, and larvae tunnel in the petioles and crown, causing extensive damage (at a maximum during the summer). Eliminating nematodes and other natural enemies of the weevils would increase their usefulness as control agents. (Lynch-Wisconsin)
W78-00254

HOST SPECIFICITY OF NEOCHETINA BRUCHI HUSTACHE (COLEOPTERA CURCULIONIDAE), A BIOLOGICAL CONTROL AGENT FOR WATERHYACINTH,
Agricultural Research Service, Fort Lauderdale, FL. Aquatic Plant Management Lab.
B. D. Perkins, and D. M. Maddox.
Journal of Aquatic Plant Management, Vol. 14, June 1976, p. 59-64. 4 tab, 5 ref.

Descriptors: *Hosts, *Aquatic weed control, *Water hyacinth, *Biocontrol, Aquatic plants, Insects, South America, California, Reproduction, Growth stages.
Identifiers: *Host specificity, *Neochetina bruchi, *Mottled water hyacinth weevil, Weevils, Argentina.

The mottled water hyacinth weevil (Neochetina bruchi) was tested for host specificity to water hyacinth (Eichhornia crassipes). Tests in Argentina, where the weevil is native, and in California show that N. bruchi might be safely introduced into the U.S. as a biological control for water hyacinth. Federal approval was granted, and the first introductions were made in July, 1974. The weevil was subjected to starvation or no-choice tests, paired plant tests, plant group tests, and larval tests. Twenty-eight plant species (17 families) were compared with water hyacinth for weevil feeding damage, oviposition, and oocyte development. This insect has never been recorded as a pest of any cultivated crop in South America, and the life cycle can only be completed on water hyacinth due to the underwater pupation site in the plant's roots. In the starvation tests, 11 of 25 plants were fed on, with the greatest feeding occurring on E. crassipes, E. azurea, and Pontederia cordata. The same three plants were fed upon most notably in the paired plant tests (10 plants tested); Commelina virginica and Tripogandra elongata were fed on slightly. In the plant group tests (9 plantstested) only E. crassipes and E. azurea were fed on (2,463 vs 18 feeding spots). Ten plants were tested with larvae; five were entered, but larvae survived only on E. crassipes. Of five plants tested in California in the no-choice tests, feeding occurred only on E. crassipes (89.25% of feeding spots), Sparganium americanum (10,20%), and Ludwigia arcuati (0.55%). (Lynch-Wisconsin)
W78-00255

COMBINATION OF THE MOTTLED WATER-HYACINTH WEEVIL AND THE WHITE AMUR FOR BIOLOGICAL CONTROL OF WATER-HYACINTH,
Florida Univ., Gainesville. Inst. of Food and Agricultural Sciences.
E. S. Del Fosse, D. L. Sutton, and B. D. Perkins.
Journal of Aquatic Plant Management, Vol. 14, June 1976, p 64-67. 3 tab, 16 ref.

Descriptors: *Biocontrol, *Aquatic weed control, *Water hyacinth, Florida, Hosts, Insects, Fish, Water pollution control.
Identifiers: *Amur, *White amur, *Ctenopharyngodon idella, *Mottled water hyacinth weevil, *Neochetina eichorniae, Weevils.

The effect on water hyacinth of white amur (Ctenopharyngodon idella) and the mottled water hyacinth weevil (Neochetina eichhorniae) alone and combination was tested. These organisms generally attack different parts of a water hyacinth plant--white amur feed on roots and leaves; adult weevils feed on leaves and petioles; larvae feed on the insides of leaves or petioles. The experiments were conducted in plastic pools between January, 1974 and January, 1975, and covered winter, late spring-summer, and summer-early winter. Pools with the combination of white amur and mottled water hyacinth weevil generally produced the greatest reduction in plant size and biomass, as well as general damage to the plants. The amur-weevil combination reduced the growth of the plants by 20-38% as compared with water hyacinth grown without these organisms. The fish apparently did not inhibit weevil activity. Fish alone produced the next-best results, followed by weevils alone. While N. eichhorniae is monophagous, C. idella is polyphagous, and in fact water hyacinth is not one of its favored aquatic weeds in a mixed-culture situation. The white amur will, however, eat water hyacinth if it exists in a nearly monocultural environment. (Lynch-Wisconsin)
W78-00256

A REVIEW OF METHODS FOR OBTAINING MONOSEX FISH AND PROGRESS REPORT ON PRODUCTION OF MONOSEX WHITE AMUR,
Fish Farming Experimental Station, Stuttgart, AR.
J. G. Stanley.
Journal of Aquatic Plant Management, Vol. 14, June 1976, p 68-70. 1 tab, 16 ref.

Descriptors: *Biocontrol, *Aquatic weed control, *Reproduction, Fish, Methodology, Water pollution control.
Identifiers: *White amur, *Ctenopharyngodon idella, *Monosex fish, *Amur, Broodfish carp, Carp, Cyprinus carpio, Androgenesis, Gynogenesis, Sex reversal.

Previous work suggests that fish exclusively of one sex would be useful for testing the aquatic weed control possibilities of exotic species without the danger of their reproducing in a native habitat. Methods of producing monosex fish gynogenetically and androgenetically are presented, in the present study along with sex reversal techniques. For gynogenesis, white amur eggs were treated with irradiated broodfish carp (Cyprinus carpio) milt. All gynogenetic white amur examined have been females. Use of gynogenesis to produce monosexes is limited to those species with XX females and XY males. Yield is low, and therefore is feasible only in species with high fecundity, such as white amur. The androgenetic method involves fertilizing carp eggs with nonirradiated white amur milt, and can be used to produce only male fish. Sex reversal has been used to produce only female goldfish and Tilapia mossambica. Young are fed an androglen to reverse females into apparent males. Each male is mated with a normal XX female/ sex-reversed males sire all females. For white amur this process would take about five years, but a test cross to distinguish sex-reversed from ordinary males is unnecessary if monosex gynogenetic females are used, and the time required would be much shorter. It is estimated that monosex fish can be produced and raised to stocking size for about $1 each, an estimated annual cost of $10/ha, or less than 0.1 the cost of chemical or mechanical treatment. (Lynch-Wisconsin)
W78-00257

RESPONSE BY PEARL MILLET TO SOIL INCORPORATION OF WATERHYACINTHS,
Florida Univ., Gainesville. Dept. of Soil Science.
J. V. Parra, and C. C. Hortenstine.
Journal of Aquatic Plant Management, Vol. 14, June 1976, p 75-79. 3 tab, 42 ref.

Descriptors: *Water hyacinth, *Recycling, *Fertilizers, Fertilization, Organic matter, Agriculture, Crops, *Crop production, Productivity, Nutrients, Essential nutrients, Chemical analysis, Florida.
Identifiers: *Pearl millet, Millet, Pennisetum americanum, Lake Alice(Fla), Uptake.

Water hyacinths contain relatively high concentrations of plant nutrients, and are very desirable green manures. This study shows the effects on yields of pearl millet (Pennisetum americanum) of field use of fresh water hyacinths and the resulting change in soil chemical make-up. Water hyacinths removed from Lake Alice (Florida), and allowed to dehydrate and partially decompose, were added to a Spodosol classified as Wachula fine sand. Plots were prepared as follows: water hyacinths only (two levels); N-P-K fertilizer only (two levels); combinations of both; and a control containing neither. Water hyacinth applications along increased yields in the first harvest (19 July 1974), and nearly doubled or tripled yields in the second harvest (4 September 1974), depending on level of application yields of 3245 kg/ha control vs 6330 kg/ha and 8774 kg/ha). No effects from fertilizer alone were observed in the first harvest; somewhat higher yields were noted in the second harvest at the higher application level (60-26-50). Heavy rainfall probably negated the effect of mineral fertilizers in the first harvest. Reduced rainfall and application of additional N to all plots in the second harvest increased overall yields. In the second harvest the mineral fertilizer depressed yields and nutrient uptake on plots containing water hyacinths. 27,000 kg/ha of water hyacinths produced maximum yield. C, N, P, K, Ca, Hg, Zn, Mn, and Cl content/ in the soil were all increased by addition of water hyacinths. (Lynch-Wisconsin)
W78-00259

PROCEEDINGS: LAKE TAHOE RESEARCH SEMINAR III.
Lake Tahoe Area Research Coordination Board, South Lake Tahoe, CA.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-243 479, Price codes: A08 in paper copy, A01 in microfiche. Lake Tahoe Research Seminar III, January 17, 1975, Sands Vagabond Convention Center, South Lake Tahoe, California. NSF-RA-G-75-001, NSF ISR 73-09293-A02.

Descriptors: *Watershed management, Water quality control, Erosion control, Surface runoff, Environmental effects, Revegetation, Snow removal, Ice, *California, *Nevada, Pollutants, Census, Planning, Legal aspects, Recreation, Vegetation establishment, Regulation, Watersheds(Basins), Regional development.
Identifiers: *Lake Tahoe Basin(Cal-Nev), Sierra Nevada Mountains(Cal-Nev), TRPA Plan, CTRPA Plan, Tahoe Regional Planning Agency.

Seven papers are presented as part of a quarterly series held by the Lake Tahoe Area Research Coordination Board and the Lake Tahoe Environmental Education Consortium, mostly verbatim transcriptions of tapes recorded at the seminar. Highway Ice and Snow Removal and Deicing Salt Problems at Lake Tahoe reviews alternative methods to salt for ice and snow control. '1975 Census and the Tahoe Basin' describes a census and questionnaire to be administered in six California counties, including the Tahoe Basin. 'Legal Review of Land Use Controls' discusses, land use regulation and litigation as it related to the TRPA and CTRPA. 'Erosion and Sediment Control Technology', the text of a slide presentation, presents information on an erosion control project at Northstar, Cal., a ski resort. 'Revegetation and Erosion Control at Heavenly Valley' gives deals with various methods of controlling erosion caused by snowmelt (also a slide presentation). 'Establishing Forest Cover on Harsh Sites in the Sierra Nevada' gives the results of reforestation experiments using Jeffrey pine seedlings in plantable containers. (Areawide Waste Treatment and Erosion Control Planning' discusses the purposes of the TRPA under Section 208 of the Federal Water Pollution Control Act. (See also W78-00261 thru W78-00265) (Lynch-Wisconsin)
W78-00260

HIGHWAY ICE AND SNOW REMOVAL AND DEICING SALT PROBLEMS AT LAKE TAHOE,
California State Dept. of Transportation, Sacramento.
For primary bibliographic entry see Field 5B.
W78-00261

LEGAL REVIEW OF LAND USE CONTROLS,
California Univ., Berkeley.
M. Heyman.
In: Proceedings: Lake Tahoe Research Seminar III, January 17, 1975, p. 44-75. NSF-RA-G'75-001, NSF ISR73-09293-A02.

Descriptors: *Legal aspects, *Land use, *Legislation, Regulation, Planning, Recreation, Lakes, Water quality control, Environmental effects, California, Nevada.
Identifiers: *Lake Tahoe Basin(Cal-Nev), TRPA Plan, CTRPA Plan, Tahoe Regional Planning Agency.

Developments in the Lake Tahoe Basin since the organization of the Tahoe Regional Planning Agency (TRPA) as a grant experiment in legal techniques and governmental organization are discussed. Major topics covered are land use regulation and processes of governments. TRPA and CTRPA plans are referred to. The major concern of these plans has been the protection of water quality in Lake Tahoe and other Basin lakes, and the preservation of the vegetation and natural land forms. Air pollution and shoreline regulation are mentioned. The second part of the paper is devoted to litigation dealing with land use. (See also W78-00260) (Lynch-Wisconsin)
W78-00262

EROSION AND SEDIMENT CONTROL TECHNOLOGY,
California State Water Resources Control Board, Sacramento.
A. L. Franks.
In: Proceedings: Lake Tahoe Research Seminar III, January 17, 1975, p. 76-95. NSF-RA-G'75-001, NSF ISR73-09293-A02.

Descriptors: *Erosion control, *Sediment control, Recreation, Planning, Water quality control, *California.
Identifiers: Northstar(Cal).

This is the text of a slide presentation illustrating existing and proposed methods of erosion sediment control arising from the California Water Resources Control Board's demonstration of such technology at Northstar California. The area is devoted half to living quarters and half to a ski area and to other recreational purposes. The project was begun in 1968 and by 1971 thirteen mosaics of vegetation types based on soil, geology, and reestablishment of vegetation were developed. As a result, only a few areas at Northstar have problems with erosion. Most of the soil in the area is a high-infiltration volcanic type; the runoff from most impervious areas was diverted and percolated. When this was impossible, standard methods of debris traps, drop inlet structures, screens, and energy dissipators were used. (See also W78-00260) (Lynch-Wisconsin)
W78-00263

REVEGETATION AND EROSION CONTROL AT HEAVENLY VALLEY,
H. Seibert, and M. Penniman.
In: Proceedings: Lake Tahoe Research Seminar III, January 17, 1975, p. 96-115. 1 tab. NSF-RA-G'75-001, NSF ISR73-09293-A02.

Descriptors: *Erosion control, *Revegetation, *California, *Nevada, Recreation.
Identifiers: Heavenly Valley(Cal Nev), Lake Tahoe Basin(Cal Nev).

At Heavenly Valley in the Lake Tahoe Basin of California and Nevada, the largest ski resort in the U.S. with 20 square miles of skiable terrain, one of the biggest problems in any ski area is erosion during the spring runoff. The entire mountain at Heavenly Valley is granodiorite which has been weakly glaciated, resulting in a shallow soil mantle. The surface consists of rocks mixed with finer soil. Because of its sandy nature, the soil has poor internal stability and a small amount of water causes erosion. Serration, berms, heavy jute netting, log placement, and revegetation (grass, squaw carpet, manzanita) were used in an effort to control erosion from snowmelt. Grass planting (wheatgrass and alpine timothy), using a mulching process and jute netting, cost about $10,000 per acre. To prevent vegetative disruption, ski lifts have been installed by means of helicopters, at a cost of $23,000 per lift. A table showing cost breakdown is appended to this paper, which is the test of a slide presentation. (See also W78-00260), (Lynch-Wisconsin)
W78-00264

AREAWIDE WASTE TREATMENT AND EROSION CONTROL PLANNING,
F. McLaren.
In: Proceedings: Lake Tahoe Research Seminar III, January 17, 1975, p. 125-146. NSF-RA-G'75-001, NSF ISR73-09293-A02.

Descriptors: *Erosion control, *Federal Water Pollution Control Act, Water quality control, Waste disposal, Surface runoff, Legislation, Watersheds(Basins), Planning.
Identifiers: *Lake Tahoe Basin(Cal Nev), Tahoe Regional Planning Agency, TRPA.

Under section 208 of the Federal Water Pollution Control Act, the Tahoe Regional Planning Agency (TRPA) was designated the planning agency for the Tahoe Basin, and is the only such agency in Region IX. The purpose of the project is to develop a regional water quality facilities plan, not a report or study. It will define implementable improvements necessary to control surface water runoff in the Tahoe Basin's erosion control program. Water quality standards will not be reevaluated; the program will be designed to implement existing standards. Management of all the surface water runoff, especially from urban areas, will be basic to the plan. Runoff from filling stations, golf courses, parking lots, logging areas, and streets will be considered, as well as fertilizer use, waste disposal in marinas, solid waste management, septic tanks, and shoreline erosion. (See also W78-00260), (Lynch-Wisconsin)
W78-00265

FLOATING-MATTER REMOVING APPARATUS,
Kabushiki Kaisha World Chemical, Tokyo (Japan). (Assignee).
Y. Mori.
U.S. Patent No. 4,024,063, 13 p, 16 fig, 11 ref; Official Gazette of the United States Patent Office, Vol 958, No 3, p 1195, May 17, 1977.

Descriptors: *Patents, *Water pollution treatment, *Water pollution control, *Skimming, *Floating, Oil pollution, Oily water, Scum, Equipment, Separation techniques.

The polluting matter skimming apparatus removes matter such as oil, scum, etc. floating in rivers and lakes, oceans, setting tanks, and water tanks by skimming. The skimming apparatus is comprised

of a vessel having a main floating body with at least one inlet opening provided in the sidewall and a storage container in fluid communication with the inlet opening. A gate with an opening is provided which slides over each side wall opening. When the openings are aligned polluting matter may enter. A float block at each side of the gate plate maintains the gate at a fixed level in relation to the surface of the body of water. A water jet may be used to push the polluting material to the opening of the apparatus. (Sinha - OEIS)
W78-00298

MAN'S IMPACT ON ESTUARINE SEDIMENTATION,
State Univ. of New York at Stony Brook.
J. R. Schubel, and R. H. Meade.
In: Proceedings of Conference on 'Estuarine Pollution Control and Assessment.' U.S. Environmental Protection Agency, Washington, DC, 1977. p 193-209, 6 ref. SUNY Marine Science Research Center Contribution 116.

Descriptors: *Estuaries, *Sedimentation, *Water quality control, *Baseline studies, Environmental effects, *Waste disposal, *Pollution abatement, Dreding, Estuarine environment.
Identifiers: *Outer Continental Shelf, Spoil disposal.

Estuaries are the major sites for the accumulation of sediment along the coastline. The rate of sediment accumulation in estuaries, which is already naturally high, has been increased by man's activities. The primary purposes of this report are: (1) to review some of the characteristic estuarine sedimentation processes; (2) to look at some of the ways in which man has altered these processes; (3) to assess the significance of the effects of these changes on the estuarine milieu; and (4) to recommend the types of research needed for significant advances in our understanding of estuarine sedimentation processes. (Sinha - OEIS)
W78-00392

HYDROCARBON BUDGETS FOR LAKE WASHINGTON,
Washington Univ., Seattle. Dept. of Chemistry; and Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W78-00394

SHAGAWA LAKE RECOVERY CHARACTERISTICS AS DEPICTED BY PREDICTIVE MODELING,
Corvallis Environmental Research Lab., OR.
For primary bibliographic entry see Field 5B.
W78-00417

OZONE DISINFECTION OF FLOWING WATER,
Oregon Dept. of Fish and Wildlife, Clackamas.
For primary bibliographic entry see Field 5F.
W78-00432

ACCELERATED SALT TRANSPORT METHOD FOR MANAGING GROUND WATER QUALITY,
California Univ., Davis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W78-00442

APPLICATION OF A NEW NONLINEAR PROGRAMMING CODE WITH DECOMPOSITION TO THE REGIONAL WASTEWATER-COLLECTION AND TREATMENT-LOCATION PROBLEM,
West Virginia Univ., Morgantown. Computer Center.
L. R. Padgett, A. H. Montgomery, and L. Romino, Jr.
Environment and Planning A, Vol. 8, No. 5, August 1976, p 563-571, 4 tab, 2 fig, 16 ref. OWRT A-026-WVA(1).

Descriptors: *Waste water treatment, *Mathematical models, Optimization, Systems analysis, Algorithms, Cost comparison, Management.
Identifiers: *Non-linear programming, *Decomposition.

A new, highly reliable nonlinear programming algorithm is coupled with decomposition to find the optimal solution to a regional sewage treatment system problem. The objective is to find an optimal system configuration of sources and disposal locations, and to minimize total costs. Constraints force material balances to be satisfied and require all wastewater to receive secondary treatment. The objective function is the sum of the costs of each possible component of the system, including gravity trunk sewers, force mains, pumping facilities, and treatment plants. A reliable and efficient nonlinear programming method called sequential heuristic optimization program (SHOP) is used to solve the problem. The algorithm is a penalty-function, nongradient, direct-search method. To facilitate solving this rather large, complex nonlinear problem, the wastewater system is decomposed into subsystems composed of sources and disposal locations. After optimizing the subsystems, their solution must be adjusted in such a way that they produce an optimal solution for the entire system, which requires a reliable nonlinear programming algorithm. The optimizing techniques illustrated in this study are seen as the first non-subjective method for identifying the optimal system that is available to design engineers. (Nessa-NC)
W78-00448

COOPERATIVE INSTREAM FLOW SERVICE GROUP: THE FIRST YEAR.
Fish and Wildlife Service, Fort Collins, CO. Cooperative Instream Flow Service Group.
For primary bibliographic entry see Field 4A.
W78-00497

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

OPTIMAL AERATION POLICIES FOR THE ABATEMENT OF POLLUTION IN RIVER BASINS,
Columbia Univ., New York. Dept. of Mechanical Engineering.; and Columbia Univ., New York. Dept. of Nuclear Engineering.
For primary bibliographic entry see Field 5G.
W78-00213

THE HUMAN DIMENSIONS OF WATER-RESOURCES PLANNING,
Anacapa Sciences, Inc., Santa Barbara, CA.
For primary bibliographic entry see Field 6B.
W78-00441

ALTERNATIVE MODELS FOR ESTIMATING THE TIME SERIES COMPONENTS OF WATER CONSUMPTION DATA,
Hawaii Univ., Honolulu. Dept. of Agricultural and Resource Economics.
H. Yamauchi, and W-y. Huang.
Water Resources Bulletin, Vol. 13, No. 3, p 599-610, June 1977. 2 fig, 2 tab, 16 ref. OWRT A-030-HI(4).

Descriptors: *Water consumption(Except consumptive use), *Estimating, *Time series analysis, *Mathematical models, Data collections, Behavior, Regression, Water supply, Seasonal, Equations, System analysis, Water policy.
Identifiers: *Additive and multiplicative models, Irregular components, Dummy variables, Water consumption patterns.

Understanding the behavior of different time-series components of water consumption data is essential for a more effective analysis of economic incentive effects of alternative policy measures and for closer integration of water supply and demand management. Additive and multiplicative models are used to analyze the trend (T), cyclical (C), seasonal (S) and irregular (I) components. The stepwise regression method was applied to 187 data points (January 1960 to July 1975), each representing average daily water consumption within the service area of the Honolulu Board of Water Supply. Although statistically similar results (R2 0.95 and 0.96 and respective corresponding F-ratios 277 and 307) might suggest little difference in model performances, closer analysis of the results point to important multiplicative effects which should be considered in both short-run and long-term analyses. (Bell-Cornell)
W78-00443

A HIERARCHY OF RESPONSE FUNCTIONS FOR GROUNDWATER MANAGEMENT,
Mekoroth Water Co., Tel-Aviv (Israel). Systems Engineering Dept.
For primary bibliographic entry see Field 4B.
W78-00444

A DECOMPOSITION APPROACH TO THE CAPACITY EXPANSION PROBLEM,
Case Western Reserve Univ., Cleveland, OH. Dept. of Systems Engineering.
For primary bibliographic entry see Field 4A.
W78-00500

6B. Evaluation Process

THE HUMAN DIMENSIONS OF WATER-RESOURCES PLANNING,
Anacapa Sciences, Inc., Santa Barbara, CA.
D. H. Harris.
Human Factors, Vol. 19, No. 3, June 1977, p 241-251. 1 fig, 5 tab, 13 ref. OWRT C-3064(3680)(3).

Descriptors: *Water resources, *Planning, *Decision making, *Scaling, Water quality, Reliability, Social aspects, Computers, Computer programs, Graphical analysis, Management, Conservation, Evaluation.
Identifiers: *Human factors, *Multidimensional analysis, Factor analysis, Least squares criterion, Public participation.

A framework was developed for incorporating human factors (those which concern human well-being and quality of human life) along with technical and economic factors into the water-resources planning-decision process. Initially, 388 water-resources concepts from the human domain were collected, screened, and grouped to define 42 different factors. Then, from ratings of similarity-dissimilarity by 300 raters, a matrix was generated of mean distances between all 861 possible factor pairs; the matrix was analyzed by computer-based multidimensional scaling techniques to determine the underlying dimensional structure. Finally, using procedures that paralleled those for determining factor similarity-dissimilarity, a value reflecting social importance was developed for each of the 42 factors and for the 5 basic dimensions which emerged from the multidimensional analysis. These values were found to cover a wide range; however, values for the same factors and dimensions were found to be nearly identical among different subgroups of people, even those with potentially divergent viewpoints, such as behavioral scientists and water-works professionals. (Bell-Cornell)
W78-00441

ALTERNATIVE MODELS FOR ESTIMATING THE TIME SERIES COMPONENTS OF WATER CONSUMPTION DATA,
Hawaii Univ., Honolulu. Dept. of Agricultural and Resource Economics.
For primary bibliographic entry see Field 6A.
W78-00443

GUIDE TO LAND COVER AND USE CLASSIFICATION SYSTEMS EMPLOYED BY WESTERN GOVERNMENTAL AGENCIES,
Ecology Consultants, Inc., Fort Collins, CO.
For primary bibliographic entry see Field 4A.
W78-00496

GUIDELINES FOR PREPARING EXPERT TESTIMONY IN WATER MANAGEMENT DECISIONS RELATED TO INSTREAM FLOW ISSUES.
Fish and Wildlife Service, Fort Collins, CO. Cooperative Instream Flow Service Group.
For primary bibliographic entry see Field 6E.
W78-00498

ENERGY, PUBLIC CHOICES AND ENVIRONMENTAL DATA NEEDS,
Institute of Public Administration, Washington, DC.
For primary bibliographic entry see Field 6G.
W78-00499

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

AMI DESCRIBES HOW MEAT PLANTS HAVE SAVED ENERGY.
American Meat Inst., Washington, DC. Energy Task Force.
For primary bibliographic entry see Field 3E.
W78-00171

ECONOMIC ANALYSIS OF SPRAY IRRIGATION OF POULTRY PROCESSING WASTEWATER VS. UPGRADING OF WASTEWATER TREATMENT FACILITIES,
Mogul Corp., Chagrin Falls, OH.
For primary bibliographic entry see Field 5D.
W78-00179

OPERATING AND ECONOMIC FACTORS INVOLVED IN THE STUDY OF A PACKING WASTE PROBLEM,
Illinois Univ. at Urbana-Champaign. Dept. of Bacteriology.
For primary bibliographic entry see Field 5D.
W78-00182

FEASIBILITY STUDY FOR IRRIGATING THE TRIBAL FARM ON THE CROW CREEK RESERVATION, FORT THOMPSON, SOUTH DAKOTA,
Roubal (Dana Larson) and Associates, Pierre, SD.
For primary bibliographic entry see Field 3F.
W78-00216

THE ECONOMICS OF POOR HOUSEKEEPING IN THE MEAT-PACKING INDUSTRY,
Hormel (George A.), and Co., Chicago, IL.
For primary bibliographic entry see Field 5D.
W78-00481

6D. Water Demand

ESTIMATED USE OF WATER IN THE UNITED STATES IN 1975,
Geological Survey, Reston, VA. Water Resources Div.
C. R. Murray, and E. B. Reeves.
Available from Branch of Distribution 1200 S. Eads St., Arlington, VA 22202. Circular 765, 1977. 39 p, 13 fig, 18 tab, 100 ref.

Descriptors: *Water utilization, *Water supply, *United States, *Water consumption(Except consumptive use), *Consumptive use, Municipal water, Domestic water, Livestock, Industrial water, Irrigation water, Hydroelectric plants, Surface waters, Groundwater, Freshwater, Saline water, Water reuse.
Identifiers: *Average annual water use(United States), *Per capita use, Water Resources Council regions.

Estimates of water use in the United States in 1975 indicate that an average of about 420 bgd (billion gallons per day)--about 1,900 gallons per capita per day--was withdrawn for the four principal offchannel uses which are (1) public-supply (for domestic, commercial, and industrial uses), (2) rural (domestic and livestock), (3) irrigation, and (4) self-supplied industrial (including thermoelectric power). In 1975, withdrawals for these uses exceeded by 11.5 percent the 370 bgd estimated for 1970. Increases in the various categories of offchannel water use since 1970 were: approximately 12.8 percent for self-supplied industry (mainly in electric-utility thermoelectric plants), 7.6 percent for public supplies, 10.0 percent for rural supplies, and 10.8 percent for irrigation. The quantity of freshwater consumed--that is, water made unavailable for further possible withdrawal because of evaporation, incorporation in crops and manufactured products, and other causes--was estimated to average 95 bgd for 1975, an increase of about 10 percent since 1970. Estimates of water withdrawn from the principal sources indicated that 82 bgd came from fresh ground water, 1 bgd came from saline ground water, 260 bgd came from fresh surface water, 69 bgd came from saline surface water, and 0.5 bgd was reclaimed sewage. (Woodard-USGS)
W78-00194

MUNICIPAL WATER SUPPLIES IN LEE COUNTY, FLORIDA, 1974,
Geological Survey, Tallahassee, FL. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-00198

6E. Water Law and Institutions

BASIC DATA AND ANALYSES: SELECTED ASPECTS OF GREAT LAKES ENFORCEMENT.
Enviro Control, Inc., Rockville , Md.
For primary bibliographic entry see Field 5G.
W78-00232

RESIDUE TOLERANCES FOR AQUATIC HERBICIDES,
Environmental Protection Agency, DC. Chemistry Branch.
For primary bibliographic entry see Field 5G.
W78-00241

THE AQUATIC PLANT REGULATION PROGRAM IN FLORIDA,
Florida Dept. of Natural Resources, Tallahassee. Bureau of Aquatic Plant Research and Control.
For primary bibliographic entry see Field 5G.
W78-00242

LEGAL REVIEW OF LAND USE CONTROLS,
California Univ., Berkeley.
For primary bibliographic entry see Field 5G.
W78-00262

UNIFORMITY AMONG WEATHER MODIFICATION LAWS,
Arizona Univ., Tucson.
For primary bibliographic entry see Field 3B.
W78-00440

GUIDELINES FOR PREPARING EXPERT TESTIMONY IN WATER MANAGEMENT DECISIONS RELATED TO INSTREAM FLOW ISSUES.
Fish and Wildlife Service, Fort Collins, CO. Cooperative Instream Flow Service Group.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-268 597, Price codes: A03 in paper copy, A01 in microfiche. Publication No. FWS/OBS-77/19, July 1977. 30 p. Edited by Berton L. Lamb.

Descriptors: Flow, *Water law, *Legal aspects, Institutions, Institutional constraints, *Administration, Management, *Judicial decision, *Streamflow.
Identifiers: *Instream flow.

The guidelines provide instructions and background information to biologists who believe their work may become part of a formal adjudication or administrative hearing. Topics covered include types of hearings, discovery procedures, rules of evidence and samples of testimony. (Fish and Wildlife Service)
W78-00498

6G. Ecologic Impact Of Water Development

AQUATIC SURVEY OF BIG CREEK, RICH COUNTY, UTAH,--A CRITICAL HABITAT STREAM ON NATIONAL RESOURCE LANDS AFFECTED BY LIVESTOCK.
Brigham Young Univ., Provo, Utah. Center for Health and Environmental Studies.
R. N. Winget, R. W. Baumann, and R. Williams.
Funded by Bureau of Land Management, Final Report, 17 October, 1977. 30 p, v 17 tab, 2 fig. YA-510-PH6-123.

Descriptors: *Watershed management, *Macrobenthos, *Stream improvement, *Water quality, *Coliforms, Bank stability, Land management, Grazing.
Identifiers: Environmental impact evaluation, National resource lands, Critical aquatic habitat, Grazing impacts.

Surveys were made to provide aquatic habitat and water quality baseline data to the U.S. Bureau of Land Management to be used in evaluating (1) livestock grazing impacts on the flora and fauna of Big Creek, Utah; and (2) the effectiveness of a livestock enclosure and habitat structures for stream rehabilitation. Included in the analyses are: description of existing aquatic habitats; characterizations of macroinvertebrate communities; water quality summary; and comparisons of 1975 data (from a previous study) with 1976 data. The assemblage, analysis, and recommendations presented will form the basis for land/water management decisions. Analyses indicate: riparian vegetation is possibly the most critical factor for quality aquatic habitats in small streams; optimal riffle to pool ratio should approach 3 riffle to 2 pool in area as too many pools reduce macroinvertebrate diversity and density; and grazing along stream banks should be highly controlled. (BLM)
W78-00004

AQUATIC SURVEY OF BIRCH CREEK, BEAVER COUNTY, UTAH--CRITICAL HABITAT STREAM ON NATIONAL RESOURCE LANDS AFFECTED BY LIVESTOCK,
Brigham Young Univ., Provo, Utah. Center for Health and Environmental Studies.
R. N. Winget, R. W. Baumann, and R. Williams.
Funded by Bureau of Land Management, Final Report, 17 October 1977. 33 p, iv, 15 tab, 2 fig.

Descriptors: *Watershed management, *Macrobenthos, *Stream improvement, *Water quality, *Coliforms, Bank stability, Land management, Grazing, Cutthroat trout.
Identifiers: Environmental impact evaluation, National resource lands, Critical aquatic habitat, Grazing impacts.

Surveys were made to provide aquatic habitat and water quality baseline data to the U.S. Bureau of Land Management to be used in evaluating livestock grazing impacts on the flora and fauna of Birch Creek, Utah and evaluate the potential of Birch Creek as a critical habitat for pure strain cutthroat trout. Included in the analyses are: description of existing aquatic habitats; characterization of macroinvertebrate communities; water quality summary; and changes in 1975 data from a previous study compared with 1976 data. The assemblage, analysis, and recommendations presented will form the basis for land and water management decisions and future studies involving aquatic habitats and related fauna in Birch Creek and other similar Utah streams. Analyses indicate: riparian vegetation is probably the most critical factor for quality aquatic habitats in small streams. Grazing impacts on Birch Creek are extreme with apparent damage in most of the river. The most critical factors in relation to pure strain cutthroat trout are the low stream discharges and unstable stream channels. Managed grazing could drastically improve the stream banks, but low flows in the lower stretches may limit establishment of cutthroat trout in this part of the river. If cutthroat trout were to be successfully placed in Birch Creek, quality pools will have to be established as an integral part of the available aquatic habitat of Birch Creek. (BLM)
W78-00005

NEW ENGLAND OFFSHORE MINING ENVIRONMENTAL STUDY: THE CHARACTER OF PARTICLE DISPERSION AND WATER MOVEMENT IN MASSACHUSETTS BAY AND ADJACENT WATERS,
National Oceanic and Atmospheric Administration, Miami, FL. Atlantic Oceanographic and Meteorological.
For primary bibliographic entry see Field 5B.
W78-00086

COASTAL WATER RESEARCH PROJECT ANNUAL REPORT FOR THE YEAR ENDED 30 JUNE 1976.
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5C.
W78-00134

SLUDGE IN SANTA MONICA BAY,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5B.
W78-00144

FIN EROSION PREVALENCE AND ENVIRONMENTAL CHANGES,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5C.
W78-00153

COMPARISON OF FIN EROSION DISEASE: LOS ANGELES AND SEATTLE,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5C.
W78-00154

EFFECTS OF CHROMIUM ON REPRODUCTION IN POLYCHAETES,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5C.
W78-00157

FAUNA OF OFFSHORE STRUCTURES,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5C.
W78-00158

RESPONSE AND RECOVERY OF THE BENTHOS AT ORANGE COUNTY,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5C.
W78-00159

PARTIAL RECOVERY OF THE BENTHOS AT PALOS VERDES,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5C.
W78-00160

COMPARISON OF THE BENTHOS AT SEVERAL WASTEWATER DISCHARGE SITES,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5C.
W78-00161

REGIONAL AND LOCAL VARIATION OF BOTTOM FISH AND INVERTEBRATE POPULATIONS,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5C.
W78-00162

LIFE HISTORY OF THE DOVER SOLE,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5C.
W78-00163

MAN'S IMPACT ON ESTUARINE SEDIMENTATION,
State Univ. of New York at Stony Brook.
For primary bibliographic entry see Field 5G.
W78-00392

THE ECOLOGICAL EFFECTS OF COAL STRIP-MINING: A BIBLIOGRAPHY WITH ABSTRACTS,
Colorado State Univ., Fort Collins. Natural Resource Ecology Lab.
For primary bibliographic entry see Field 5C.
W78-00495

GUIDE TO LAND COVER AND USE CLASSIFICATION SYSTEMS EMPLOYED BY WESTERN GOVERNMENTAL AGENCIES,
Ecology Consultants, Inc., Fort Collins, CO.
For primary bibliographic entry see Field 4A.
W78-00496

COOPERATIVE INSTREAM FLOW SERVICE GROUP: THE FIRST YEAR.
Fish and Wildlife Service, Fort Collins, CO. Cooperative Instream Flow Service Group.
For primary bibliographic entry see Field 4A.
W78-00497

ENERGY, PUBLIC CHOICES AND ENVIRONMENTAL DATA NEEDS,
Institute of Public Administration, Washington, DC.
F. M. Graves, and H. P. Bretsch.
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D.C. 20402. Publication No. FWS/OBS-77/04, March 19 77, 126 p. WELUT No. 029-76, FWS 14-16-0008-2103.

Descriptors: *Land management, *Decision making, *Information transfer, Water resources, Coal, *Energy, Wildlife, Fish, Planning, US Water Resources Council, Colorado, Montana, New Mexico, Utah, Wyoming.

The energy-related decision processes are described of the Bureau of Land Management, Geological Survey, Forest Service, Bureau of Reclamation, Energy Research and Development Administration, Water Resources Council, and the States of Montana, New Mexico, Utah, Colorado and Wyoming. On the basis of formal decision processes and interviews with numerous agency personnel, recommendations are made whereby the Fish and Wildlife Service can more effectively communicate wildlife information to decision makers. (Fish and Wildlife Service)
W78-00499

7. RESOURCES DATA

7B. Data Acquisition

CALCULATORS IN TIMER-COUNTERS FOR CURRENT METERS,
Papuea New Guinea Univ. of Tech., Lae (New Guinea). Dept. of Electrical and Communications Engineering.
S. R. Kormilo.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 103, No HY9, Proceedings Paper 13230, p 1031-1036, September 1977. 2 fig, 1 ref, 2 append.

Descriptors: *Instrumentation, *Current meters, *Equipment, Electronics, Laboratory tests, Flow, Measurement, Time, Timing, Engineering, Electrical engineering, Hydrology.
Identifiers: *Time interval counters, Electronic calculators, Counters.

An accurate, compact, low-cost, calculator-based electronic timer-counter for current meters was constructed and laboratory tested. Electronic calculators often offer an economically attractive alternative to both electromechanical and other forms of electronic counters. The modification of calculators so that they can act as timer-counters was described in general terms. A summary of the results of tests to determine the effect of temperature and voltage variations on the timing accuracy of a prototype electronic timer-counter was given. Laboratory tests also were performed which compared the prototype to two different electromechanical counters in operation. The tests indicated that, with a few minor changes, the electronic timer-counter would provide many advantages over the electromechanical counters. (Sims-ISWS)
W78-00077

PASSIVE REMOTE SENSING OF PHYTOPLANKTON VIA CHLOROPHYLL ALPHA FLORESCENCE,
Department of the Environment, Victoria (British Columbia). Inst. of Ocean Sciences.
R. A. Neville, and J. F. R. Gower.
Journal of Geophysical Research, Vol 82, No 24, p 3487-3493, August 20, 1977. 8 fig, 23 ref.

Descriptors: *Remote sensing, *Chlorophyll, *Phytoplankton, Fluorescence, Aircraft, Equipment, Spectrometers, Reflectance, Lakes, Oceans, Aquatic life, Plankton, Marine plants, Limnology, Oceanography.
Identifiers: *Passive remote sensing.

The spectrum of light backscattered from the sea in the visible and near infrared and, in particular, the chlorophyll alpha fluorescence line at 685 nm were observed from an aircraft under natural illumination by using a multichannel silicon diode spectrometer. The instrument was mounted in the aircraft so as to view the water surface at the Brewster angle by using a polarizer to reduce reflected skylight substantially, even under rough surface conditions. This and the relatively high red sensitivity of the ilicon diode detectors explain why the line appears here but not in previous airborne observations. The observed line height was compared with chlorophyll depth distribution measurements made from a launch and was shown to be proportional to an average of the chlorophyll concentration near the surface, weighted with depth to allow for absorption by the water of light at 685 nm. The observations were made at low (150 m) altitude, but it was shown that the observed line height is insensitive to altitude up to 1200 m. Although the lowest chlorophyll concentration encountered was 2 mg/cu m, the technique is expected to be useful for airborne mapping of chlorophyll at concentration several times smaller than this. (Sims-ISWS)
W78-00090

CALIFORNIA COASTAL PROCESSES STUDY - SKYLAB FINAL REPORT - EPN 492,
Army Engineer District, San Francisco, CA.
For primary bibliographic entry see Field 2L.
W78-00096

CALCULATION OF EVAPOTRANSPIRATION USING COLOR-INFRARED PHOTOGRAPHY,
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 2D.
W78-00212

COLOR AERIAL PHOTOGRAPHY FOR AQUATIC PLANT MONITORING,
Texas A and M Univ., College Station. Remote Sensing Center.
For primary bibliographic entry see Field 5G.
W78-00244

A QUANTITATIVE SAMPLING METHOD FOR HYDRILLA-INHABITING MACROINVERTEBRATES,
Florida Univ., Gainesville. School of Forest Resources and Conservation.
For primary bibliographic entry see Field 5G.
W78-00245

WATER FLOW METER,
S. J. Niskin.
U.S. Patent No. 4,026,148, 5 p, 5 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 958, No 5, p 1904, May 31, 1977.

Descriptors: *Patents, *Water measurement, *Flow, *Flow measurement, Instrumentation, Flowmeters, Water pollution control.

The object of the invention is to provide a water flow meter with means in the propeller hub for collecting excess oil in the meter caused by changes in pressure and temperature of the oil in the housing that also contains the counter mechanism whereby a reverse change in temperature and pressure will restore the oil to the housing. Oil is prevented from being discharged from the meter and intake of air or water is prevented from entering on a reverse change in pressure and temperature. A reservoir of oil within a flexible diaphragm is provided that is exposed to the atmosphere and water so that as an increase in temperature or lowering of pressure will permit the oil in the housing to expand and flow into the reservoir and a decrease in temperature and increase in pressure will permit the return of the oil from the reservoir to the housing. The water flow meter has a hollow housing adapted to contain counter mechanism, a propeller shaft extending into the housing, a hollow propeller hub mounted on the free end of the shaft, an opening in the hub, a bore extending through the shaft from the hub to the housing, a flexible diaphragm extending over the bore in the hub adapted to contain a liquid lubricant capable of flowing to and from the housing effected by changes in temperature and pressure and seal means mounted on the housing and extending about the shaft preventing the ingress of water. (Sinha-OEIS)
W78-00266

MEASURING DEVICE FOR WATER FLOW IN A BURIED PIPE,
J. C. Fitzgerald.
U.S. Patent No. 4,026,151, 6 p, 5 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 958, No 5, p 1906, May 31, 1977.

Descriptors: *Patents, *Water measurement, Flow, Flow measurement, Instrumentation, Sediments, Silts, Pipes, Pipe flow.

A measuring device to determine the depth of sediment in the floor of a buried pipe and the rate of flow of water through the pipe includes a first shaft with a sleeve telescoped on the saft with the lower end of the shaft being adapted to engage the floor of the pipe and with the lower end of the sleeve being adapted to rest on the surface of sediment in the pipe so that the relative axial displacement of the sleeve in relation to the pipe will measure the depth of the sediment in the floor. A float which is connected to the sleeve and includes a lift member for raising and lowering the float on a suspension means is connected to a switch. When tension on the suspension means is relaxed and the float is supported by the water instead of a suspension means, energy from a source flows through the switch and indicates the relaxation of the tension. A member on the float is provided which is movable in response to the rate of water flow through the pipe and an electrical circuit indicates the rate of flow of water through the pipe. (Sinha - OEIS)
W78-00267

LATCH RELEASING MECHANISM FOR WATER SAMPLERS,
Trippensee Corporation, Saginaw, MI. (Assignee).
R. P. Snyder, and E. P. Deja.
U.S. Patent No 4,027,538, 6 p, 6 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 959, no 1, p 75, June 7, 1977.

Descriptors: *Patents, *Sampling, *Water sampling, Remote control, Equipment.
Identifiers: Kemmerer style water sampler.

A Kemmerer style water sampler has a tubular body open at both ends and through which extends a connecting rod. The lower end of the connecting rod is fixed to a closure for the lower end of the body. The upper end of the connecting rod is latched to an upper closure and carries a latch member. A pair of clasp members mounted on the upper closure move in and out of latching position. Each clasp member is provided with an upstanding motion transmitting member having inclined, confronting surfaces spaced apart to provide a chamber. Reciprocably accommodated in the chamber is an operating member that is tapered complementally to the inclination of the surfaces of the motion transmitting members so that movement of the operating member axially in one direction effects movement of the clasp members out of latching engagement with the latch member, thereby enabling the upper and lower closures to seal the opposite ends of the body. (Sinha-OEIS)
W78-00279

WASTE WATER SAMPLING SYSTEM,
For primary bibliographic entry see Field 5A.
W78-00301

7C. Evaluation, Processing and Publication

NOAA-ARS COOPERATIVE SNOW RESEARCH PROJECT - WATERSHED HYDRO-CLIMATOLOGY AND DATA FOR WATER YEARS 1960-1974,
National Weather Service, Silver Spring, MD. Office of Hydrology.
For primary bibliographic entry see Field 2C.
W78-00068

RAINFALL SYNTHESIS WITH SCANTY DATA,
Universidad Catolica de Chile, Santiago. Escuela de Ingenieria.
For primary bibliographic entry see Field 2B.
W78-00082

CALIFORNIA COASTAL PROCESSES STUDY - SKYLAB FINAL REPORT - EPN 492,
Army Engineer District, San Francisco, CA.
For primary bibliographic entry see Field 2L.
W78-00096

GROUND-WATER LEVELS IN THE UNITED STATES, 1972-74. NORTH-CENTRAL STATES.
Geological SSurvey, Reston, Va. Water Resources Div.
Available from Branch of Distribution, USGS, 1200 S. Eads St., Arlington, VA 22202, price $2.25. Water-Supply Paper 2163, 1977. 89 p, 9 fig.

Descriptors: *Water levels, *Groundwater, *Water wells, *Well data, *Central US, Iowa, Kansas, Minnesota, Nebraska, North Dakota, South Dakota, Wisconsin, Basic data collections, Aquifers, Water utilization.
Identifiers: *North-central states.

This report was prepared from ground-water levels measured from 1972-74, by the U.S. Geological Survey in cooperation with the States of Iowa, Kansas, Minnesota, Nebraska, North Dakota, South Dakota, and Wisconsin, and with other agencies. Water-level measurements in wells are given in feet with reference to either mean sea level or land-surface datum. Mean sea level is the datum plane on which the national network of precise levels is based; land-surface datum is a datum plane that is approximately at land surface at each well. If known, the altitude of the land-surface datum above mean sea level is given in the well description. The height of the measuring point above or below land-surface datum is given in each well description. (Woodard-USGS)
W78-00191

GROUND-WATER LEVELS IN THE UNITED STATES, 1971-74. SOUTHWESTERN STATES.
Geological Survey, Reston, VA. Water Resources Div.
Available from Branch of Distribution, USGS, 1200 S. Eads St., Arlington, VA 22202, price $2.25. Water-Supply Paper 2162, 1977. 86 p, 6 fig.

Descriptors: *Water levels, *Groundwater, *Water wells, *Well data, *Southwest US, Arizona, California, Hawaii, Nevada, New Mexico, Basic data collections, Aquifers, Water utilization.

This report was prepared from ground-water levels measured from 1971-74, by the U.S. Geological Survey in cooperation with the States of Arizona, California, Hawaii, Nevada, and New Mexico, and with other agencies. Water-level measurements in wells are given in feet with reference to either mean sea level or land-surface datum. Mean sea level is the datum plane on which the national network of precise levels is based; land-sur-

face datum is a datum plane that is approximately at land surface at each well. If known, the altitude of the land-surface datum above mean sea level is given in the well description. The height of the measuring point above or below land-surface datum is given in each well description. (Woodard-USGS)
W78-00192

SUMMARY GROUND-WATER RESOURCES OF LUZERNE COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, PA. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-00193

WATER RESOURCES DATA FOR GEORGIA, WATER YEAR 1976.
Geological Survey, Doraville, GA. Water Resources Div.
Water-Data Report GA-76-1, April 1977. 411 p, 5 fig.

Descriptors: *Georgia, *Hydrologic data, *Surface waters, *Water quality, Water resources, Water temperature, Gaging stations, Streamflow, Flow rates, Lakes, Reservoirs, Sampling, Sites, Water analysis, Chemical analysis, Sediments.

Water resources data for the 1976 water year for Georgia consist of records of stage, discharge, and water quality of streams; stage and contents of lakes and reservoirs. This report contains discharge records for 99 gaging stations; stage for 9 gaging stations, stage and contents for 16 lakes and reservoirs; water quality for 20 continuous stations and 108 periodic stations. Also included are 115 crest-stage stations, 3 miscellaneous discharge measurements and miscellaneous sediment samples at 24 gaging stations. Records for a few pertinent stations in bordering States are also included in this report. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Georgia. (Woodard-USGS)
W78-00200

FLUVIAL SEDIMENT DATA FOR IOWA: SUSPENDED-SEDIMENT CONCENTRATIONS, LOADS AND SIZES: BED-MATERIAL SIZES: AND RESERVOIR SILTATION,
Geological Survey, Cheyenne, WY. Water Resources Div.; and Geological Survey, Iowa City, IA.
J. R. Schuetz, and W. J. Matthes Jr.
Iowa Geological Survey, Iowa City, Technical Information Series No 6, May 1977. 410 p, 1 fig, 2 tab, 21 ref.

Descriptors: *Sediment transport, *Iowa, *Streams, *Sediment discharge, *Reservoir silting, Suspended load, Particle size, Sediment yield, Sedimentation, Bottom sediments.

This report is a compilation of the fluvial sediment data collected and published by the U.S. Geological Survey and other Federal agencies for the State of Iowa. The compilation includes daily extremes, monthly summaries, particle-size analyses of suspended-sediment, particle-size analyses of bed materials at some daily suspended-sediment stations, suspended-sediment concentrations and loads for samples collected at periodic and miscellaneous sites, and reservoir sedimentation studies on streams. (Woodard-USGS)
W78-00201

WATER RESOURCES DATA FOR NEW YORK, WATER YEAR 1976--VOLUME 1. NEW YORK EXCLUDING LONG ISLAND.
Geological Survey, Albany, NY. Water Resources Div.
Water-Data Report NY-76-1, June 1977. 615 p, 8 fig, 1 tab.

Descriptors: *New York, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.

Water resources data for the 1976 water year for New York consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; water quality of precipitation; and water levels and water quality of ground water. This report (Volume 1) contains discharge records for 210 gaging stations; stage only records for 41 gaging stations (includes 31 lake and reservoir stations, 8 tide stations, and 2 other river stations); stage and contents for 21 other lakes and reservoirs; water quality for 74 gaging stations, 15 partial-record stations, and 8 precipitation stations; and water levels for 16 observation wells. Also included are 146 crest-stage partial-record stations and 5 low-flow partial-record stations. Additional water data were collected at various sites, not involved in the systematic data program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System collected by the U.S. Geological Survey in cooperation with State, Federal, and other agencies in New York. (Woodard-USGS)
W78-00202

WATER RESOURCES DATA FOR NEBRASKA, WATER YEAR 1976.
Geological Survey, Lincoln, NE. Water Resources Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-265 441, Price codes: A16 in paper copy, A01 in microfiche. Water-Data Report NE-76-1, May 1977. 407 p, 5 fig, 3 tab.

Descriptors: *Nebraska, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Water resources, Gaging stations, Streamflow, Flow rates, Water wells, Water levels, Lakes, Reservoirs, Sampling, Sites, Water analysis, Chemical analysis, Sediments, Water temperature.

Water resources data for the 1976 water year for Nebraska consist of records of stage, discharge, and water quality of streams; stage and contents of lakes and reservoirs; and water levels and water quality in wells and springs. This report contains discharge records for 146 gaging stations; stage and contents for 9 lakes and reservoirs; water quality for 40 gaging stations, 18 ungaged stations, 27 partial-record flow stations, and 96 wells; and water levels for 66 observation wells. Also included are 114 crest-stage partial-record stations and 12 low-flow partial-record stations. Additional water data were collected at various sites, not part of the systematic data collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Nebraska. (Woodard-USGS)
W78-00203

HYDROLOGIC DATA FOR URBAN STUDIES IN THE FORT WORTH, TEXAS METROPOLITAN AREA, 1975,
Geological Survey, Austin, TX. Water Resources Div.
R. M. Slade, Jr., and J. M. Taylor.
Geological Survey open-file report 77-266, June 1977. 96 p, 3 fig, 5 tab.

Descriptors: *Urban hydrology, *Rainfall-runoff relationships, *Storm runoff, *Urban runoff, *Hydrologic data, Small watersheds, Streamflow, Flow rates, Peak discharge, Flood profiles, Watershed management, *Texas.
Identifiers: *Fort Worth(Tex).

This report contains rainfall and runoff data collected during the 1975 water year for Sycamore Creek, Sycamore Creek tributary, Dry Branch, and Little Fossil Creek study areas in Fort Worth, Texas. The information will be useful in determining the extent to which progressive urbanization will affect the yield and mode of occurrence of storm runoff. Detailed rainfall-runoff computations, including hydrographs and mass curves, are presented for nine storm periods during the water year. (Woodard-USGS)
W78-00209

WATER RESOURCES DATA FOR NEW YORK, WATER YEAR 1976--VOLUME 2. LONG ISLAND.
Geological Survey, Albany, NY. Water Resources Div.
Available from the National Technical Information Service, Springfield, VA 22161, Water-Data Report NY-76-2, May 1977. 180 p, 8 fig, 1 tab.

Descriptors: *New York, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.
Identifiers: *Long Island(NY).

Water resources data for the 1976 water year for New York consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; water quality of precipitation; and water levels and water quality of ground water. This report (Volume 2) contains discharge records for 17 gaging stations; water quality for 17 gaging stations, 3 partial-record stations, 292 wells, and 3 precipitation stations; and water levels for 103 observation wells. Also included are 88 low-flow partial-record stations. Additional water data were collected at various sites, not involved in the systematic data collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System collected by the U.S. Geological Survey in cooperation with State, Federal, and other agencies in New York. (Woodard-USGS)
W78-00210

NATIONAL WATER QUALITY INVENTORY. 1974 REPORT TO THE CONGRESS. VOLUME I.
Environmental Protection Agency, Washington, DC. Office of Water Planning and Standards.
For primary bibliographic entry see Field 5A.
W78-00214

WHERE TO FIND WEATHER AND CLIMATIC DATA FOR FOREST RESEARCH STUDIES AND MANAGEMENT PLANNING,
North Central Forest Experiment Station, St. Paul, MN.
D. A. Haines.
USDA Forest Service General Technical Report NC-27, St. Paul, Minnesota, 1977. 15 p, 16 fig, 11 ref, append.

Descriptors: *Climatic data, *Weather data, *Information retrieval, Metereology, *Forest management, Research and development, *Data collections, Networks, Data storage and retrieval, Statistics.

Weather and climatic data are needed for a variety of forest research studies and management planning. Much of this data has already been recorded and published. This document describes the weather-observing networks already in operation, the data available from them, and where the information is stored. (Witt-IPC)
W78-00386

APPLICATION OF A NEW NONLINEAR PROGRAMMING CODE WITH DECOMPOSITION TO THE REGIONAL WASTEWATER-COLLECTION AND TREATMENT-LOCATION PROBLEM,
West Virginia Univ., Morgantown. Computer Center.
For primary bibliographic entry see Field 5G.
W78-00448

A DECOMPOSITION APPROACH TO THE CAPACITY EXPANSION PROBLEM,
Case Western Reserve Univ., Cleveland, OH. Dept. of Systems Engineering.
For primary bibliographic entry see Field 4A.
W78-00500

8. ENGINEERING WORKS

8A. Structures

SETTLEMENT OF LARGE HYDRAULIC STRUCTURES,
Army Engineer Div. Lower Mississippi Valley, Vicksburg. Technical Engineering Branch.
For primary bibliographic entry see Field 8D.
W78-00099

8B. Hydraulics

LONGITUDINAL DISPERSION WITH DEAD ZONES,
Canterbury Univ., Christchurch (New Zealand). Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W78-00075

FINITE ELEMENT APPROACH TO WAVES DUE TO LANDSLIDES,
Thessaloniki Univ., Salonika (Greece). Faculty of Technology.
C. G. Koutitas.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 103, No HY9, Proceedings Paper 13218, p 1021-1029, September 1977. 10 fig, 11 ref, 2 append.

Descriptors: *Waves(Water), *Landslides, *Model studies, Mathematical models, Reservoirs, Finite element analysis, Numerical analysis, Energy, Soils, Soil stability, Hazards, Safety, Hydraulics.
Identifiers: *Wave action.

The finite element method based on the weighted residuals principle was used for the description of the generation and the unidirectional propagation of waves in a channel due to the temporal vibration of some cross sections of it (lateral earth motion due to landslide on the channel bank). The deriving algebraic system was solved by iterations. The integration in time was achieved by a leap frog finite differences scheme for the computation of surface elevation and velocity functions. The finite element model was applied on a typical channel, and several controls on the obtained solutions proved the descriptive capacity of the model. (Sims-ISWS)
W78-00076

CALCULATORS IN TIMER-COUNTERS FOR CURRENT METERS,
Papuea New Guinea Univ. of Tech., Lae (New Guinea). Dept. of Electrical and Communications Engineering.
For primary bibliographic entry see Field 7B.
W78-00077

UNIFIED VIEW OF WASH LOAD AND BED MATERIAL LOAD,
Thessaloniki Univ., Salonika (Greece).; and Florida Univ., Gainesville. Dept. of Engineering Sciences.
For primary bibliographic entry see Field 2J.
W78-00078

SOME ASPECTS OF QUADRATIC WEIRS,
Indian Inst. of Science, Bangalore. Dept. of Civil Engineering.
K. K. Murthy, and K. G. Pillai.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 103, No HY9, Proceedings Paper 13231, p 1059-1076, September 1977. 10 fig, 3 tab, 19 ref, 2 append.

Descriptors: *Weirs, *Flow measurement, Orifice flow, Orifices, Discharge(Water), Flow, Hydraulic models, Laboratory tests, Hydraulics, Water resources.
Identifiers: *Quadratic weirs, Proportional weirs, Weir design.

The theory of proportional weirs, including the slope discharge continuity theorem, was applied to obtain an excellent solution to the design of a quadratic weir having a compound base. Nine differently shaped quadratic weirs were designed, and pertinent data for their use were given in enclosed tables. A total of 8 weirs with 3 different shapes were tested hydraulically, and results showed consistent discharge coefficient values between 0.607 and 0.610. One particular shape of weir was the most sensitive and had the additional advantage of having equal slopes at the junction of the base weir and the upper 'complimentary weir.' The importance of the quadratic weirs as proportional orifices and notch-orifices was stressed. Also the usefulness of quadratic weirs as the most sensitive weirs with the least relative error was underlined. (Sims-ISWS)
W78-00079

BASIC PRINCIPLES OF RIVER HYDRAULICS,
Alberta Univ., Edmonton. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W78-00080

WORLD-WIDE VARIATIONS IN HYDRAULIC GEOMETRY EXPONENTS OF STREAM CHANNELS: AN ANALYSIS AND SOME OBSERVATIONS,
Saint David's Univ. Coll., Dyfed (Wales). Dept. of Geography.
For primary bibliographic entry see Field 2E.
W78-00081

A REGIONAL RESERVOIR STORAGE ANALYSIS FOR EASTERN MASSACHUSETTS AND RHODE ISLAND,
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 4A.
W78-00195

THE STRUCTURE OF A TURBULENT FLOW IN A CHANNEL OF COMPLEX SHAPE,
Geological Survey, Atlanta, GA. Water Resources Div.
H. J. Tracy.
For sale by GPO, Supt. of Documents, Washington, DC 20402. Professional Paper 983, 1976. 24 p, 20 fig, 9 ref.

Descriptors: *Channel flow, *Turbulent flow, *Shear stress, *Momentum transfer, Model studies, Rotational flow, Hydrodynamics, Channel morphology, Closed conduit flow.

Measurements of the Reynolds stresses and the mean motion pattern were made in a uniform turbulent motion in a conduit consisting of a large, nearly square section joined by a smaller rectangular section. The results indicate that the boundary shearing stress is nearly constant over large segments of the boundaries. The magnitudes of the lateral and the vertical components of turbulence are not the same near a boundary and the component normal to the boundary is smaller than the component parallel to the boundary. The difference in the two components in the corner regions of the channel produces secondary mean motions in the plane of the channel section. The strength of the motion depends upon the angle subtended by the corner. A principal function of the secondary motions is to transfer momentum into the corner regions and, elsewhere, to compensate for the excess force due to the shear gradients. In the absence of the secondary motions, the fluid must stagnate and separate from the boundaries in certain regions and be greatly accelerated in others. The secondary motions are conventionally described in terms of symmetrical rotations in cells bounded by the corner bisectors. The measured motion pattern is at variance with this view, unless the symmetry is confined to a very local region. (Woodard-USGS)
W78-00211

ADJUSTABLY SUBMERSIBLE BREAKWATER,
E. T. Dougherty.
U.S. Patent No 4,027,486, 6 p, 6 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 959, no 1, p 57-58, June 7, 1977.

Descriptors: *Patents, *Breakwaters, *Engineering structures, *Shore protection, Harbors, Coastal structures, Waves(Water), Ocean waves.

A new and useful breakwater assembly is disclosed which employees elongated tanks which are in parallel relationship with respect to each other, and are interconnected at their aligned ends to form an undulating breakwater structure. The lower end tank is suitably moored and all the tanks are individually adjustable with regard to the buoyance so that some of the tanks will float on the surface of the water and other of the tanks will be submerged at various depths below the surface. The floating tanks serve to dampen wave action and the submerged tanks provide an anchoring stability to the breakwater assembly and will also dampen undercurrents. The anchoring or mooring stability provided to the breakwater assembly by the submerged tanks is due to the inherent resistance of submerged objects to sudden movements. In addition to the submersible feature, the breakwater assembly is variable as to the length and width to accomodate the needs of particular installation sites. It includes the capability of easily changing the number of tanks in parallel relationship and the capability of axially interconnecting as many of the tanks as are needed to achieve any desired width of the breakwater. (Sinha-OEIS)
W78-00277

FLOATING BREAKWATER,
J. G. O. Watson.
U.S. Patent No. 4,023,370, 10 p, 12 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 958, No 3, p 965, May 17, 1977.

Descriptors: *Patents, *Breakwaters, *Engineering structures, *Shore protection, Floating, Waves(Water), Ocean waves, Wave length, Attenuation.

A floating breakwater comprises a buoyant structure including open spaces the sides of which join each other at angles other than right angles and each of which encloses a body of surface water. Preferably the structure is composed of several joined bodies at least some of which are buoyant and surfaces of which form sides of the spaces. In one form of the invention the bodies are elongated and are joined at their ends to form triangulat

spaces. Conveniently the distance separating the base and apex of each triangular space is substantially the same and the bodies are so arranged in the structure that adjacent spaces have an opposite aspect to provide the structure with a continuous substantially parallel sea and lee wall. (Sinha - OEIS)
W78-00291

PRESSURIZED WATER WHEEL,
For primary bibliographic entry see Field 4A.
W78-00293

HYDRAULIC COEFFICIENTS FOR PE PIPE OF LARGE DIAMETER: STUDIES ON THE PIPE DISTRIBUTION IN SYSTEMS FOR SPRINKLER IRRIGATION: V, (IN JAPANESE),
Okayama Univ. (Japan). Faculty of Agriculture.
Y. Murakami, H. Kobashi, and S. Kubo.
Trans Jap Soc Irrig Drain Reclam Eng. 37, p 47-53, 1971.

Descriptors: Pipes, *Plastic pipes, *Sprinkler irrigation, Hydraulics, Irrigation systems, Distribution systems.
Identifiers: *Hydraulic coefficient, *Polyethylene pipes.

Measured values of the coefficients in hydraulic flow formulas were: f = 0.011 approx. 0.012, C = 170 approx. 177, for the 600 mm straight pipe (PE, polyethylene) and f = 0.018 approx. 0.019, C = 130 approx. 132, Ks = 0.33 approx. 0.34, n = 0.011 for the inverted siphon, respectively. The cause of increased resistance against flow for the inverted siphon is regarded due mainly to the effect of air in the pipe. Judging from the coefficients and Reynolds numbers for the straight pipe and inverted siphon, the Darcy-Weisbach formula can be applied for the former pipe and the Scobey formula for the latter. Diagrams were prepared to estimate the coefficients measured within the region of diameter where Hazen-Williams formula or Scobey formula is applicable respectively. In using a certain constant in place of correct coefficient in a restricted range of diameters it is preferable to adopt 2 respective constants for 2 subdivided range of diameter, e.g. by dividing a total range of 65 approx. 1500 mm at 300 mm, rather than use single constant for the whole range. Both the values of C determined with the Matsuda's slide-rule for hydraulic use and of K from the prepared nomograph agreed accurately with corresponding logarithmic calculations.--Copyright 1974, Biological Abstracts, Inc.
W78-00297

8C. Hydraulic Machinery

ELETROMAGNETIC PISTON PUMP.
Water and Waste Treatment, Vol 20, No 6, p 30, June, 1977.

Descriptors: *Pumps, *Hydraulic equipment, *Construction materials, *Liquid wastes, *Equipment, Water conveyance, Chemical wastes.

An electromagnetic piston pump produced by Appliance Components for use with a wide range of both corrosive and non-corrosive liquids is described. The pump is suggested for application in chemical and pharmaceutical industries, for use with industrial and municipal water, and for use with medical or laboratory equipment. The self-priming pump is 2.25 in x 3.25 in and has a capacity of 11 gal/hr with a maximum discharge height of 65 ft and a maximum lift of 10 ft. Because the metal piston is the only moving part, the pump does not require a driving motor and pump arrangement, drive shaft, moveable gasket, or delicate diaphragm. Corrosion- and high wear-resistant materials are used for the internal components. The materials used for the molded seals and valves can be varied according to the liquids being handled. (Schulz-FIRL)
W78-00063

METHOD FOR ADJUSTING AN AUTOMATIC SLUICE WITH A VIEW TO ENSURING A DETERMINED LEVEL,
Societe Generale de Constructions Electriques et Mecaniques (Alsthom), Paris Cedix (France). (Assignee).
P. Alexandre.
U.S. Patent No 4,027,487, 5 p, 4 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 959, no 1, p 58, June 7, 1977.

Descriptors: *Patents, *Sluices, *Sluice gates, Hydraulic equipment, Flow, Water conveyance, Water levels, Water control, Channels.

The automatic sluices of the sector-shaped oscillating float type have a variable opposing couple intended to regulate hydraulically the flow of a canal to keep a constant level upstream of the sluice. The sluices are essentially constituted by a frame comprising a sector-shaped gate, centered on an axis of rotation, a sector-shaped float centered on the same axis of rotation and protruding on the upstream face of the gate and counterweights integral with the frame, the assembly oscillating about the axis situated substantially at the mark of the level to be regulated. These sluices comprise an opening stop which limits the opening to that for which the base of the float is tangent to the upstream level to be regulated, for beyond, the sluice would tilt into an excessively open position. The method consists in introducing a certain quantity of water in the float of the sluice, then in effecting the balancing normally by means of the counterweights, the upstream level regulated by the sluice then being that of its axis of oscillation. Then to regulate the sluice in order for it to ensure the required level above or below the mark of oscillation of its axis, water is added to or withdrawn from the float up to a height equal to the required shift in height of the level. Simultaneously, the opening stop is installed, this fixing the limit travel of the mobile part. (Sinha-OEIS)
W78-00278

FLOATING WAVE POWERED PUMP,
American Cyanamid Co., Stamford, CT. (Assignee).
L. C. Tharaldson.
U.S. Patent No. 4,023,515, 6 p, 4 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 958, No 3, p 1014, May 17, 1977.

Descriptors: *Patents, *Waves(Water), Floating, Pumping, Energy conversion, Energy transfer, *Pumps, Pumping plants, Engineering structures.
Identifiers: Swells.

This invention relates to wave powered pumping systems for utilizing the energy of waves and swells in bodies of water, particularly the oceans. The system can accept swells and waves from any direction and of any magnitude and utilize both upward and downward movements. Such a pumping system incorporates a variable stroke double action piston type pump which operates with both upward and downward movements of varying magnitude, without requiring any adjustments for tides and other variations. The floating platform has floats hinged about the periphery of the platform. Nozzles for water jets may be carried on the platform below the water line to provide positioning and/or propulsion forces for the platform. Such a pumping system can be utilized for water pumping directly and/or providing water under pressure for conversion to other forms of energy. (Sinha - OEIS)
W78-00292

8D. Soil Mechanics

FIELD TEST SECTIONS SAVE COST IN TUNNEL SUPPORT,
K. S. Lane.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-246 982, Price codes: A04 in paper copy, A01 in microfiche. Report NSF-RA-T-75-035 from the Underground Construction Research Council, Published by the American Society of Civil Engineers, April 1975. 9 fig, 8 tab, 75 ref, 4 append. NSF G141842.

Descriptors: *Tunneling, *Tunnel construction, *Tunnel design, Tunnel linings, Tunneling machines, Tunnel failure, Dams, Diversion structures, Diversion tunnels, Hydraulic structures, Design, Costs, Civil engineering.
Identifiers: *Tunnel supports, Field test sections, Great Britain, Sweden.

This study summarized 50 case histories where instrumented test sections were a key factor in realizing major savings from newer concepts in designing underground works. Savings were most often in the costly item of tunnel support, using field tests to validate newer approaches and to establish confidence therein. Where the tests formed a coordinated program, savings have been spectacular. One example cited was Britain's saving half the construction cost on recent London tunnels. In Sweden, cost of underground works has been reduced to equal or below that of surface alternatives for many facilities such as power plants, sewage and water treatment, oil storage, and parking. Despite growing objections to locating such facilities in the surface environment, high cost has deterred U.S. planners from considering the underground alternative. Major cost improvement could change this, allowing greater use of the underground to alleviate several U.S. problems: urban congestion, pollution, and energy waste. The case record charts the road: wider trial of newer and less costly concepts (many developed abroad), using field tests to validate applicability for U.S. conditions. (Sims-ISWS)
W78-00097

SETTLEMENT OF LARGE HYDRAULIC STRUCTURES,
Army Engineer Div. Lower Mississippi Valley, Vicksburg. Technical Engineering Branch.
R. I. Kaufman, and W. C. Sherman.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A 033 146, Price codes: A03 in paper copy, A01 in microfiche. Army Engineer Waterways Experiment Station Miscellaneous Paper S-71-23, October 1971. 33 p, 17 fig, 3 ref.

Descriptors: *Hydraulic structures, *Settlement(Structural), *Soil mechanics, *Mississippi River, Floodways, Flood control, Structures, Concrete structures, Control structures, On-site investigations, Design, Soils, Foundations, Foundation investigations, Floodgates, Civil engineering.

A number of large hydraulic structures have been constructed as features of the project for flood control and improvement of the Lower Mississippi River. The structures are founded on alluvial soils and subjected to differential heads resulting from variations in river stage. Because of the relatively unfavorable foundation conditions and seasonal variations in foundation loadings, movements of the structures were observed during and after construction to determine the performance of the structures with respect to design assumptions. Presented in this paper were the results of the above mentioned observations on three selected structures (the Old River Control Overbank Structure, the Old River Control Lowsill Structure, and the Morganza Control Structure). Also presented were conclusions regarding the performance of the structures. Extensive instrumentation and careful

observations of the large hydraulic structures in alluvial soils indicated that the structures are functioning as designed. It was concluded that proper design procedures based on current soil mechanics techniques can produce acceptable results. Generally, observed settlements were in the range of magnitude of settlements predicted in design. Preload fills were utilized and were successful in eliminating a large part of settlement which would otherwise occur at the structure abutments. With proper design procedures, settlements of large structures in alluvial soils can be controlled to reasonable values. However, some seasonal movement will occur due to variations in temperature and river stages. The structures have performed adequately since construction. (Sims-ISWS)
W78-00099

PREVENTION OF SAND BAR FORMATION AT OUTLETS INTO THE SEA OR OTHER BODIES OF WATER,
Wijesiriwardena (Don Bernard), Arcadia, CA. (Assignee).
L. G. Wirasinha.
U.S. Patent No. 4,023,369, 7 p, 8 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 958, No 3, p 964, May 17, 1977.

Descriptors: *Patents, *Sand bars, *Shallow water, *Silting, *Deposition, Sediment control, Water pollution sources, Silt, Erosion, Drains.
Identifiers: Gutters.

An apparatus and method carried out for preventing formation of sand bars from sand or silt at the outlet of a body of water emptying from inland into another body of water such as a lake or the sea. At least one elongated gutter is provided at the outlet of the body of water. The gutter is placed above the level of the water in the outlet and may or may not extend through the mouth of the outlet into the receiving body of water. Water is pumped into the gutter to an overflow condition so that it spills over the edges and by gravity falls and creates a splash erosion condition. (Sinha - OEIS)
W78-00290

CHARACTERIZATION OF COARSE POROUS MEDIA,
California Univ., Berkeley. Sanitary Engineering Research Lab.
F. H. Pearson, and A. J. McDonnell.
Journal of the Environmental Engineering Division, Proceedings, American Society of Civil Engineers, Vol. 103, No. EE4, Proceedings Paper 13125, p 615-624, August 1977. 5 fig, 17 ref, 2 append. OWRT A-030-PA(7).

Descriptors: *Porous media, *Particle shape, *Surfaces, Particle size, Filters, Pores, Dimensions, Measurement, Volume, Graphical analysis, Weight, Friction, Head loss.
Identifiers: *Shape factor, *Surface area, Geometrical solids, Unit weight, Flatness, Elongation, Diameter, Crushed limestone.

A methodology was presented to characterize shape factor and surface area of coarse filter media. For several regular geometrical solids, the variation of shape factor with a dimensionless parameter of maximum relationships was similar to variation obtained by measurement on particles of crushed stone. Using this relationship, the shape factor and surface area of a stone particle could be estimated with a standard error of 4% from maximum dimension and weight, where the unit weight is known. (Visocky-ISWS)
W78-00436

8F. Concrete

SETTLEMENT OF LARGE HYDRAULIC STRUCTURES,
Army Engineer Div. Lower Mississippi Valley, Vicksburg. Technical Engineering Branch.
For primary bibliographic entry see Field 8D.
W78-00099

8G. Materials

RUBBER LININGS ALLEVIATE STICKY POLLUTION PROBLEM.
New Civil Engineer, No. 250, p 19, July, 1977.

Descriptors: *Synthetic rubber, *Rubber, *Construction materials, *Linings, *Settling basins, Aeration, Oxidation, Costs, Food processing industry, Industrial wastes, Treatment facilities, *Waste water treatment.
Identifiers: Vaihingen(Germany), Animal glue.

Synthetic rubber has been used to line four pyramidal basins at a waste water treatment plant in Vaihingen, West Germany. Construction costs for the rubber-lined plant, which includes surface aeration in a 4,500 cu m oxidation basin, a 700 cu m settling pond, and a 800 cu m secondary settling pond, were approximately 60% of costs for a concrete equivalent. The waste water treatment facility is designed to treat an effluent flow from an animal glue and gelatin factory of 150-190 cu m/h with peak flows up to 200 cu m/h. Du Pont's Hypalon synthetic rubber was chosed for use at Vaihingen because of its weather resistance, ease of sealing, chemical resistance, flexibility, and tensile strength. A concrete slab and stainless steel dowels are used to hold the lining in place and minimize the effects of suction in the place of the rotors. Waste water dischrged from the new Conradt treatment plant into the Enz River has a pH of 7.2-7.4 and a BOD of 1510 mg/liter. (Schulz-FIRL)
W78-00020

SOME ASPECTS OF QUADRATIC WEIRS,
Indian Inst. of Science, Bangalore. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W78-00079

MEASURING DEVICE FOR WATER FLOW IN A BURIED PIPE,
For primary bibliographic entry see Field 7B.
W78-00267

INHIBITED ACID COMPOSITION FOR CLEANING WATER SYSTEMS,
G. F. Connelly Jr.
U.S. Patent No. 4,025,359, 6 p, 4 tab, 6 ref; Official Gazette of the United States Patent Office, Vol 958, No 4, p 1637, May 24, 1977.

Descriptors: *Patents, *Descaling, *Cleaning, *Water conservation, Water conveyance, Pipes, Water utilization, Carbonates, Metals, Separation techniques, *Scaling.
Identifiers: *Pipe cleaning.

This invention relates to the removal of scale comprising metal oxides and carbonates from the interior of galvanized pipes or steel pipes and other galvanized or steel vessel employed for the transport or storage of aqueous fluids. Pipe cleaning compositions which are fundamentally aqueous hydrochloric acid solutions containing a blend of inhibitors including furfural, and diethylthiourea are used to remove scale from galvanized or steel pipes without undue attack on the metal of the pipe. Various ratios of dilution can be used for different purposes, depending upon the type of pipe or water holding vessel which is being cleaned. (Sinha - OEIS)
W78-00302

8I. Fisheries Engineering

ELECTROTAXIC AND NARCOTIC RESPONSES OF CHANNEL CATFISH TO VARIOUS ELECTRICAL PULSE RATES AND VOLTAGE AMPLITUDES,
Fish Farming Experimental Station, Stuttgart, AR.
J. E. Ellis.
The Progressive Fish-Culturist, Vol. 37, No. 3, p. 155-157, 1975; 1 tab, 7 ref.

Descriptors: *Fish behavior, *Fish guiding, *Channel catfish, Size, Electrical studies, Electrical currents, Electrical equipment, Catfishes, Marine fish, Fish physiology, Dimensions.
Identifiers: *Electrotaxic response, *Narcotic response, Electrical pulse rates, Voltage amplitudes.

The combination of voltage and frequency of pulsation required to lead and control channel catfish (Ictalurus punctatus) was investigated. A general relation was found to exist between size of fish, frequency of pulsation, and applied voltage for inducing a taxic or narcotic response. Each frequency tested tended to be selective for fish of a particular size group. The amount of current that any given fish received was dependent upon its length. (Katz)
W78-00433

10. SCIENTIFIC AND TECHNICAL INFORMATION

10B. Reference and Retrieval

WHERE TO FIND WEATHER AND CLIMATIC DATA FOR FOREST RESEARCH STUDIES AND MANAGEMENT PLANNING,
North Central Forest Experiment Station, St. Paul, MN.
For primary bibliographic entry see Field 7C.
W78-00386

10C. Secondary Publication And Distribution

CHEMICALS AND ALLIED PRODUCTS, (LITERATURE REVIEW),
Union Carbide Corp. South Charleston, W. Va.
For primary bibliographic entry see Field 5D.
W78-00012

FRUIT-, VEGETABLE-, AND GRAIN-PROCESSING WASTES, (LITERATURE REVIEW),
Environmental Associates, Inc., Corvallis, OR.
For primary bibliographic entry see Field 5D.
W78-00025

MEAT-, FISH-, AND POULTRY-PROCESSING WASTES, (LITERATURE REVIEW),
Battelle Columbus Labs., OH.
For primary bibliographic entry see Field 5D.
W78-00028

FERMENTATION INDUSTRY, (LITERATURE REVIEWS),
Purdue Univ., Lafayette, IN.
For primary bibliographic entry see Field 5D.
W78-00029

TEXTILE WASTES, (LITERATURE REVIEW),
Talbot (Richard S.) and Associates, Media, PA.
For primary bibliographic entry see Field 05D.
W78-00052

THERMAL EFFECTS, (LITERATURE REVIEWS),
Oak Ridge National Lab., TN. Environmental Sciences Div.
For primary bibliographic entry see Field 05C.
W78-00352

THE ECOLOGICAL EFFECTS OF COAL STRIP-MINING: A BIBLIOGRAPHY WITH ABSTRACTS,
Colorado State Univ., Fort Collins. Natural Resource Ecology Lab.
For primary bibliographic entry see Field 05C.
W78-00495

10F. Preparation Of Reviews

STATE-OF-THE-ART SURVEY AND ECONOMIC COMPARISON OF FREEZING PROCESSES.
Office of Water Research and Technology, Washington, D.C.
For primary bibliographic entry see Field 03A.
W78-00003

NEED FOR NEW AND BETTER MEMBRANES,
Office of Water Research and Technology, Washington, D.C. Membrane Processes Div.
For primary bibliographic entry see Field 03A.
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W78-00062	5D	W78-00140	5B	W78-00218	5C	W78-00296	2L
W78-00063	8C	W78-00141	5B	W78-00219	5C	W78-00297	8B
W78-00064	5B	W78-00142	5A	W78-00220	5B	W78-00298	5G
W78-00065	5A	W78-00143	5B	W78-00221	5G	W78-00299	3F
W78-00066	5D	W78-00144	5B	W78-00222	5C	W78-00300	3F
W78-00067	5E	W78-00145	5A	W78-00223	2C	W78-00301	5A
W78-00068	2C	W78-00146	2J	W78-00224	5B	W78-00302	8G
W78-00069	3A	W78-00147	5A	W78-00225	5A	W78-00303	5D
W78-00070	5B	W78-00148	5A	W78-00226	5C	W78-00304	5D
W78-00071	2J	W78-00149	5A	W78-00227	5B	W78-00305	5D
W78-00072	2F	W78-00150	5A	W78-00228	2J	W78-00306	5D
W78-00073	2G	W78-00151	5C	W78-00229	5C	W78-00307	5D
W78-00074	2C	W78-00152	5A	W78-00230	5C	W78-00308	5F
W78-00075	5B	W78-00153	5C	W78-00231	5B	W78-00309	3A
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